RAILROAD GAZETTE

FRIDAY, NOVEMBER 16, 1877.

American v. English Locomotives.

The following letter, published over the signature "B." in *Engineering* of Oct. 25, was suggested by a letter to that paper from Mr. Howard Fry, which contained much of the matter given in his recent letter to this paper on Fairlie and "Consolidation" locomotives:

Your correspondent, Mr. H. Fry, in an interesting letter in your last issue but one, appears to me a little at sea in some of his facts and deductions therefrom. Judging from a case or cases that have come under his observation, he has the impression that the engines supplied from England for use on colonial lines are generally unsuitable and ill-adapted for the light rails with which these lines are laid. Further considering that the Fairlie engine has been put forward as meeting every difficulty in the three particulars of narrow gauge, sharp curves and light rails, and hearing and knowing some of the objections raised against its use, he comes to the conclusion that our best card is played out and that in any competition with American engines we cannot but fail. To those who know what engines have been of late years sent to our colonies such opinions will, I believe, appear misconceptions, as generally every care has been used to adapt them to the conditions under which they have to work. And more frequently than not this means the use of engines of the bogie class in one form or other. Your correspondent enlarges on the merits and growing popularity of the "Consolidation" type, and asks what description of engines the Fairlies sent to Queensland were to supersede. Singularly enough these are "Consolidations," but of course of dimensions suited to the line. This is 3 ft. 6 in. gauge laid with 40 lb. or 45 lb. rails; worst grade, 1 in 50; curves, 330 ft. radius. The engines weigh 18½ tons, have outside cylinders 12 in. in diameter by 20 in. stroke, three pairs coupled wheels, one being midway under firebox, and a two-wheeled pony bogie in front. The fixed wheel base is 7 ft. 2 in., the centre wheels also have no tire flanges. The weight on coupled wheels is 15 or 15¼ tons for the three pairs. These engines have been long in use and reordered from time to time, two lots having been built during the present year, and they will probably stand their ground against all present competitors. The same class has been repeatedly sent to the Cape and other colonies, so that whatever merit attaches to this particular engine it has been independently appreciated here as in America. On the Cape railways the same principle has been carried further in the form of a larger tank engine with pony bogie at each end. This allows a 15 in. cylinder, 18 tons adhesive weight, and yet a maximum of 3 tons per wheel. On the very extensive light Indian State lines, the stock is nearly all bogie but none of it Fairlie, neither can the latter be said to have gained a footing on any main line in this country. And what is said as to the use of light engines on the particular lines mentioned might be shown to be the same elsewhere. As to "Consolidation" engines of a large class (5 tons per wheel) Mr. Fry considers them an improvement on anything we have here. The conditions of service are, however, very different. In the United States, rails seldom exceed 60 lbs. or 65 lbs., and 100 wagon trains at slow speeds are not impracticable—here 80 lb. or 84 lb. steel rails and a passenger service that forbids extreme loads. Our inside cylinder goods engine can be built large enough (say 17½ by 26 cylinders) to do the maximum practicable work and still not exceed 6 tons or so per wheel. As a case in point one of such engines was lately loaded up to 75 wagons on a line in the North, with the result of pulling away draw-bars and wagon headstocks, and the great length of train necessitated running through. In this particular case 62 was found the maximum practicable load. Our frequent and fast passenger trains would make extreme loads on our main lines unmanageable and dangerous. The six-coupled goods engine seems a machine leaving little to be desired, and where it gives sufficient power to go from 35 tons to 45 tons as in the American, of course means much increased cost and working expenses. It is a little singular that the advocacy of eight coupling comes from those who very lately told us that the four-coupled standard American engine had adequate adhesion for any goods train. That opinion facts have rightly modified, and on our part we should welcome light from any quarter to learn where we can.

And with every disposition to take hints, the number of improvements that we can usefully adopt does not seem large. The adaptation of two-wheel bogies with the spring arrangements, by which these are rendered safe, has merit, but we have few classes to which these could be added. Not so, however, on the Continent, where the universal goods engine, the outside cylinder overhung boiler type, sorely needs remodeling. French and German engineers moving round and round in their own circle, and receiving nothing from others, are content to keep their unwieldy machine, though its unsteadiness confines it to the slowest speeds, and even then it works with a concentration of weight that makes it most destructive to the rails; nor are their passenger engines much better—all seems sacrificed to adhesion and tractive force. And in America, the land of original mechanical ideas on many subjects, the absence of foreign work has probably contributed to keep everything very much in a few stereotyped grooves. We may claim more freedom here, for we have had to consult everybody's varied requirements. At home it cannot be said that any expense or trouble has been spared to make our railways as near perfection as may be.

So far as concerns some of the details of American engines, there are points the wisdom of which appears from this side very negative. Allow me to instance a few:

Frames.—The why and wherefore is certainly a puzzle. When just fifty years ago, Bury's had to make the most of the resources of a blacksmith's shop, and when at a later date large plates could not be obtained, the thing looked reasonable enough, but now that at a dozen places plates of any desired size can be got without weld, and at exceedingly cheap rates, it does seem strange that any one will incur so much labor, inconvenience and slowness of manufacture, for so inferior a result. An English frame is machine work from beginning to end; four sets can be drilled and slotted at once, and with proper tools at a surprising speed. The surfaces planed, all attachments are accurate and widely spaced. It is rigid vertically and elastic laterally, and, unlike the American, does not cripple the width of firebox shell, and compel abnormal modes of getting the firebox into place, neither does it need its nose keeping up by the characteristic stay to smokebox.

Boiler.—Wherein is the *rationale* of ¼ and ⅝ plates in barrels and fire-box shells. We know well enough how long ⅞ and ½ last, and the thinner would seem poor economy. Also why steel fire-boxes failing "at the rate of from 1 to 10 per cent. annually" by these alarming rents, when copper will stand safely and be good value to melt up when taken out. The Pennsylvania Railroad regulations as to a *weekly* inspection and mapping out of broken stays tell their own tale.

Connecting and Coupling Rods.—Why not made solid? Wherefore the straps, gibs, cotters, bolts and nuts, and *hoc genus omne?* They all smack of the days when steam hammers were not.

Cast-Iron Wheels.—Are these not better confined to shunting engines and small sizes? Some of the Pennsylvania standards have a strong family likeness to nearly extinct species (the last survivors of which linger in the neighborhood of Darlington), whereat the world generally wonders.

General Style.—In England the object is to make all working parts accessible, but to keep out of sight all minor rods, pipes and excrescences, to study symmetry and simplicity, and to avoid tawdry ornamentation.

The pepper-castor style of thing, usual on American locomotives, we should deem very indifferent taste, and not quite equal to the modern engines on the Midland and other main lines here. And is the cab made in the best possible way? Would not light iron plate be both cheaper in first cost, and more durable, as well as neater in appearance? The general suitability of American engines and their work is unquestionable, but a little importation of English ideas would do good. The use of the bogie truck, much in abeyance formerly, is now very general on this side, both on engine and carriage stock.

I must apologize for having wandered somewhat from the main point of your correspondent's letter, but would not be understood as questioning the special advantages of the particular engine he advocates. Given the conditions favorable to its use, it may be the best thing possible, and he has done a service by calling attention to the fact so clearly.

Contributions.

The Care of Road Bed in time of High Water—How to Stop a Washout—Muskrats—Roadmasters Should not Burn their Boots on the Stove.

TO THE EDITOR OF THE RAILROAD GAZETTE:

People are often deceived by appearances. Trusting to appearances is not always a good thing to do; yet, with railroad men, it is sometimes the only thing they can do. Perhaps it would be better if they trusted more to appearances than they do. For instance, a bridge cannot *appear safe* unless it has been *examined*. A bridge or culvert must be *seen* in order to appear either safe or dangerous. It is the not knowing what the appearances are that frequently brings trouble to trainmen—more frequently than trusting to appearances, or trusting to what has been seen. To know what the appearances are is the main thing; then act accordingly. It is not always possible to know whether a bridge or culvert has been damaged or not until the water subsides. All may appear safe above the surface of the water while the work of destruction may be silently going on below. If soundings and probings fail to disclose mischief a close observation of the surface of the water may indicate what is going on below. A whirlpool near the face of a wall is evidence that water has effected an entrance through a crack or that a portion of the wall has been undermined, and water is running back of the wall. A speck of foam, a chip, or some light floating substance floating in a circle, on the surface of the water, shows that a tiny stream is slowly but surely leading the waters to the work of destruction. If water has found a passage out of the proper channel the quantity and force of the fugitive element may be known by the size of the circle described by floating substances and the velocity of their movements. As soon as water has found a passage sufficiently large to allow of the discharge of a continuous stream, however small at first, it rapidly becomes larger. At first the surface of the water above the aperture will not be disturbed sufficiently to be discernable, except by the movement of floating substances, as above mentioned. These substances will at first move slowly in a continuous circle on the surface, but as the discharge of water through the break becomes greater the chips, etc., are drawn under the surface and disappear. If sticks, etc., of any considerable size, are drawn into the whirlpool, and lodge in the passage, the lodgment may be known by its checking the flow or discharge of water, which will be evident by a reduction in the velocity and dimensions of the whirlpool. If articles drawn in do not cause any interruption of the discharge, it is evident that they have been discharged below and their appearance should be looked for, which will indicate the direction of the stream which is doing the damage. The "evil," if watched on the lower side of the embankment, may show the nature and extent of the wash. Rocks, trees, logs and driftwood will sometimes form an eddy or back current which works away quietly below, giving no sign of what is going on, but the action and force, as well as the direction of the currents, can be ascertained by throwing in blocks of wood attached to lines. Fasten a piece of iron or a stone a few feet from the block of wood on the line and this will serve to indicate more clearly the direction and force of the currents. If the currents are noticed to carry gravel, clay, particles of cement or any material of which the masonry or embankment is composed it is certain that destruction has commenced. In this case perhaps the most that can be done will be to remove, if possible, the obstruction that causes the destructive currents and throw rubble and riprap where the wash is supposed to be going on. But of course action in such cases must be governed by the peculiar circumstances, no two cases admitting of similar treatment. But in case an embankment is being destroyed by the process first mentioned, the work of destruction may be readily stopped by the use of bundles of hay, straw or grass. Marsh hay is preferable for the purpose but if that is not convenient, other hay, fine brush or straw, or weeds, tied up in bundles and thrown into the whirlpool, will effectually stop the wash. When the aperture has been well stopped with hay, etc., it should be supplemented with gravel, if possible. Muskrat holes are frequently the prime cause of the destruction of embankments and bridges. An embankment, culvert or a bridge abutment may be proof against any amount of high water, yet a pair of these animals will soon perforate a road-bed so that a moderate freshet will make swift work of destruction. Our railroads and canals have been destroyed to the amount of hundreds of thousands of dollars, and there is no knowing how many lives have been lost by neglecting to hunt out and stop muskrat holes. Trackmen should be instructed to examine thoroughly all culverts, embankments and abutments wherever these animals exist. The grass and weeds may hide a rat-hole, and where dead grass has not been burned as it should have been it becomes matted down like a carpet and may cover numberless holes that are to all purposes a mine that will be sprung immediately on any considerable rise of water. When these holes are discovered they should be stopped by ramming wads of grass into them as far as can be reached with a stout pole. Pack the wads in as snugly as possible until the hole is nearly full, then dig away so that a yard or more of gravel may be packed in and around the hole to complete the embankment. The graveling is necessary to make a safe job of it.

Thousands of miles of our railroads are located in swampy wildernesses, with culverts numerous and shammy, where muskrats swarm by thousands, preying upon the works of man; yet some of the States have enacted that the killing of a muskrat is finable to the extent of five dollars. "Killed by State sovereignty" might be a proper verdict on many occasions of railroad disaster; but what are we going to do about it? Perhaps the railroad companies had better exterminate the rats, even at five dollars per head. At all events, if this law were repealed some roads would make more money to "haul off" their trains and go to trapping than they will by struggling for traffic at ruinous rates. The foregoing hints will be serviceable on many occasions if prompt action is taken, but roadmasters and engineers of way should have their forces drilled to understand the peculiarities of each locality, so that the situation may be taken in at once, and the culverts in the remote swamp or the bridge over the mountain stream treated according to good sense and the circumstances. Have your men "well in hand," and don't spend too much of your time in the office with your feet on the stove.

WM. S. HUNTINGTON.

"Salisbury" Iron.

I.

Nearly every one who has been in any way connected with, or interested in, the mechanical departments of railroads has heard of "Salisbury" iron, but it is doubtful whether any considerable proportion of those who have, or even of those who use it, have any distinct idea of where it comes from, how it is made, or what its distinctive qualities are. It may, therefore, be said, in the first place, that "Salisbury" iron comes from Salisbury, and that Salisbury is in the northwestern corner of Litchfield County, and that the latter is in the northwestern corner of the State of Connecticut. Salisbury, in other words, is the northwestern town of Litchfield County, Conn., and is represented in the map, fig. 1, a town in that State, meaning a subdivision of a county, or a township, as such subdivisions are called in some other States. In form it is nearly a parallelogram, and borders on the southern boundary of Massachusetts for about four miles, and on the eastern side of the State of New York for about ten miles. It is within this boundary that the mines are located from which the celebrated "Salisbury" iron is made. About the centre of the town is a village, also called Salisbury, near which are the mines from which the ore is taken. The mines are represented in the map by irregular black spots, and are called respectively the Old Hill, Davis and Chatfield ore beds, and are on the eastern slope of the Tocconuc range of hills. The Davis bed is located near the village of Salisbury, the Chatfield and Old Hill beds are about two miles southwest of it.

These mines have been worked for a long time. As early as 1734 a forge was erected in the village of Lime Rock, the present headquarters of the Barnum Richardson Company, which is now the owner of the above mines, and of a number of furnaces which will be described hereafter. This pioneer forge was erected by Thomas Lamb and the ore for it was procured from what was then called the "Hendricks," now the Davis, mine. The iron was produced in what was called a refining fire, similar to a blacksmith's forge, in quantities of about 150 pounds at a time.

About the year 1748 a forge was erected in the present village of Lakeville, then called Furnace Village, and in 1762 John Haseltine, Samuel Forbes and Ethan Allen (the latter of Ticonderoga fame) purchased the property and built a blast furnace, which is supposed to have been the first blast furnace built in the State. Fig. 2 represents a sectional view of this old furnace, showing its form and size as nearly as can be made out from the data now in existence. The production of this old furnace was 2½ tons of iron in 24 hours. Three tons of ore and 250 bushels of charcoal were used per ton of iron. The lining *A A* of the furnace was slate, *B B* "fire stone" from Haverstraw on the Hudson, *C C* yellow clay used for stopping grouting, and *D D* was white limestone from the Lakeville quarries.

This furnace was sold by the parties who built it the following year to Charles and George Caldwell, of Hartford, who ran it until 1768. Figs. 3 and 4 represent side and end elevations of the blowing apparatus used with this furnace in 1776. Its construction will be readily understood from the engravings. *A*, fig. 3, was an old-fashioned leather bellows, there being two of these, *A*, *A*, shown in fig. 4. These were driven by a water wheel, *B*, *B*, the shaft of which was provided with tappets, *C*, *C*, fig. 3, which engaged with a lug, *D*, attached to a lever, *G F F*, by which the bellows was operated. This comparatively rude apparatus of a hundred years ago appears in strong contrast when compared with the large blowing engines of the present day.

In 1768 the property was sold to Richard Smith, of Hartford, an English gentleman, who ran it successfully till the war of the revolution began, when, being a royalist, he left the country and the furnace without an agent. The property was not confiscated, but the State took possession of it and appointed Col. Joshua Porter the agent for its management, and proceeded to manufacture cannon, cannon balls, shells, etc., for the general government. Large quantities of these were produced here. The severe tests applied to these guns, in proving them, established, at this early period, the high character of

the iron for tenacity and great strength. Gov. Morris and John Jay were frequently here as agents of Congress attending to the proofs and casting of the guns. The ship of Commodore Truxton, the Constellation, and the ship Constitution ("Old Ironsides") and the battery in New York were armed with the Salisbury cannon. After the war the navy was to a considerable extent supplied with guns from the Salisbury region.

In 1781 a forge on Mt. Riga was built by Abner or Peter Woodin. Daniel Ball succeeded him and for many years the works were known as Ball's Forge.

In 1785, or about that time, Richard Smith returned and took possession of the furnaces and property, but soon after sold them and returned to England. Large numbers of potash kettles weighing nearly half a ton each, and pig iron for the forges and foundries, were then produced by the furnace, which continued to be the only blast furnace in that section for a long time.

Seth King and John Kelsey commenced building a furnace at Mt. Riga about 1806, but were not able to finish it, and in 1810 it came into possession of Messrs. Holley & Coffing, who completed it within the year, and for many succeeding years carried on an extensive and profitable business in the manufacture of pig iron, anchors, screws and various kinds of merchant iron. These works, and those at Lakeville, have long been abandoned, however.

In the spring of 1820 Milo Barnum, the founder of the present Barnum Richardson Company, who was born in Dover, Duchess County, New York, and who was then thirty years of age, settled in Lime Rock, a village in the southeastern corner of the town of Salisbury, and engaged in business as a merchant. The first foundry for remelting pig iron was built in Lime Rock about the year 1830, and soon after came under the control of Mr. Barnum, who associated with him his son-in-law, Leonard Richardson, and a few years later his son, Wm. H. Barnum, the head of the present company, and now a member of the United States Senate, was made a partner, the firm then being Barnum, Richardson & Co. The foundry business was carried on in a small way, in connection with the store, the production consisting chiefly of clock and sash weights, plow

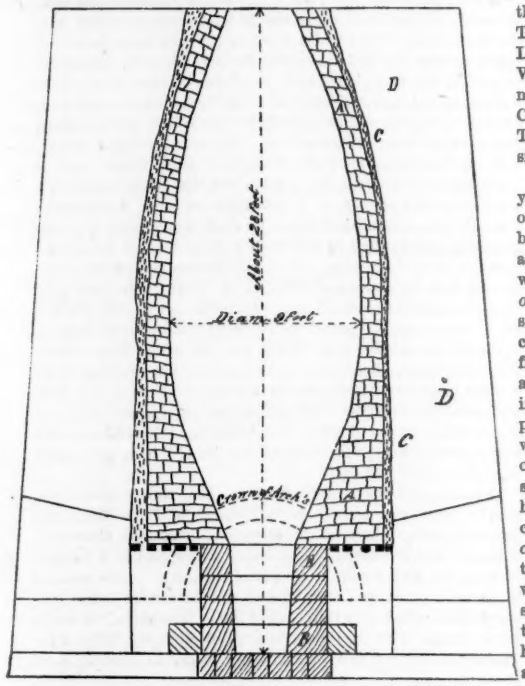


Fig. 2.

castings and other small work. The business gradually increased, however, and about 1840 they began the manufacture of railroad work, such as chairs, frogs, heel-blocks, etc., for the Western Railroad (now part of the Boston & Albany), then being built from Springfield, Mass., to Albany. The castings were transported by teams from the foundry to Chatham, about 50 miles.

As the great tensile strength, combined with the chilling properties of the Salisbury iron renders it specially valuable for the manufacture of chilled cast-iron car wheels, their manufacture naturally followed other railroad work. The iron early obtained its present excellent reputation for making car wheels, ordnance, malleable iron and machinery.

In 1852 Milo Barnum retired from active participation in the business, and the firm name was changed to Richardson, Barnum & Co., under whose management the business rapidly increased. In 1858 they obtained possession of the "Beckley" furnace at East Canaan, and in 1862 they purchased the "Forbes" furnace at the same place. About this time they also bought the foundry at Nos. 64 and 66 South Jefferson street, Chicago, Ill., and organized a joint-stock company under the name of the "Barnum & Richardson Manufacturing Company" for carrying on the foundry business at that place. This foundry is supplied with iron from the Salisbury region. In 1864 the existing joint-stock company was formed, called the "Barnum Richardson Company," and since its organization its facilities for manufacturing iron have been largely increased by the erection of new works and by acquiring further interests in mining companies already in existence. A second foundry was erected at Lime Rock in 1870, a third furnace at East Canaan in 1872 with many improvements in construction which will be described further on. A new wheel foundry was built in Chicago in 1873 by the company there. The Chicago foundry now has a capacity of 200 and that at Lime Rock of 120 car wheels per day.

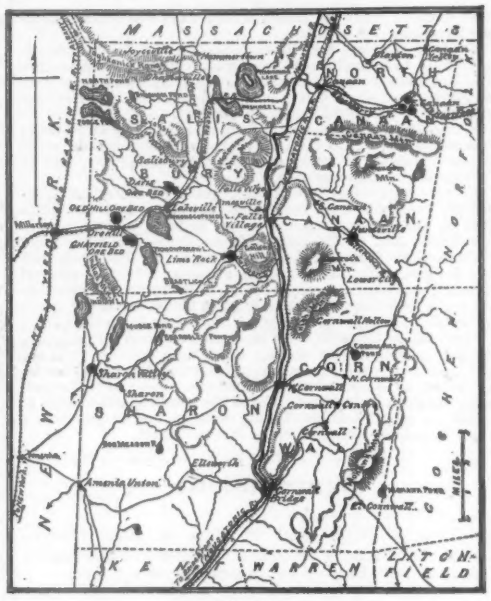


Fig. 1.

At present there are eight furnaces, which, it is claimed, are the only ones which are making genuine pure Salisbury iron. These are located as follows: three at East Canaan, one at Lime Rock, one at Millerton in New York State, one at Sharon Valley, one at Cornwall bridge and one at Huntsville, in connection with which is the wheel foundry of Washburn, Hunt & Co., in Jersey City, having a capacity of 150 wheels per day. The ore which is used in these furnaces is obtained exclusively from the "Old Hill," "Davis" and "Chatfield" mines.

The "Old Hill" bed has now been worked for over a hundred years, the Chatfield for about seventy-five and the Davis for over fifty years. The ore is a "brown hematite," which before being smelted is first broken up by a Blake's stone-crusher, and is then washed in what is known as a Bradford "ore-washer," an elevation of which, divested of all the accessories of building, machinery, etc., is represented by fig. 5. This consists of two revolving drums, *A* and *B*. *A* is made of cast-iron plates perforated with holes. The ore as it comes from the mine is fed into the trough *C C* at *C'*, with a stream of water which carries it down the trough into the receiving head *m* of the drum. The agitation produced by the revolution of the drum or "sorter" causes the water to wash off all the earth and other impurities from the ore, and the smaller lumps pass through the holes in the first sorter *A*, and are carried down the trough *D D* to the receiving head *n* of the second drum *B*, and the larger pieces of ore escape at the delivery head *l*, and are carried thence up to a *crusher* where they are again broken up and passed down the trough *C C* and through the drum *A*. The drum *B* is made with long, narrow slits through which the water impurities and smaller particles of ore escape into the trough *E E*, from which they are conducted aside by another trough, *F*. The ore which has been separated from those escapes at the delivery head *o*, and thence is conducted by the trough *G* into a cart below, and then transported to the furnace.

The ore is smelted with charcoal exclusively, to produce which the companies that control the furnaces own over 100,000 acres of land, which is generally unfit for cultivation and is held simply to produce timber for charcoal.

The blast for the furnaces is warmed up to about 400 degrees and has a pressure of from one-half to three-quarters of a pound per square inch.

Fig. 6 represents a section of one of the latest forms of furnace now used. The air for this is conducted from the blower to the pipe *A*, which is located in an oven, *O O*, into which the hot gases from the furnace are admitted through an archway, F. The pipe A is connected by a series of ∩-shaped cast-iron pipes or syphons, the form of the section of which is that of a condensed letter O. These syphons connect *A* with *B*, which in turn is connected in a similar way with *C*. The air is thus exposed to a very large surface and after being warmed is carried down alongside the furnace by two pipes, one of which, *D D*, is shown in dotted lines. These pipes are connected at the lower ends with a horizontal pipe, *F*, which encircles one side of the furnace, and from which the air is carried down to the tuyeres, *T T*, by branch pipes, *G G*.

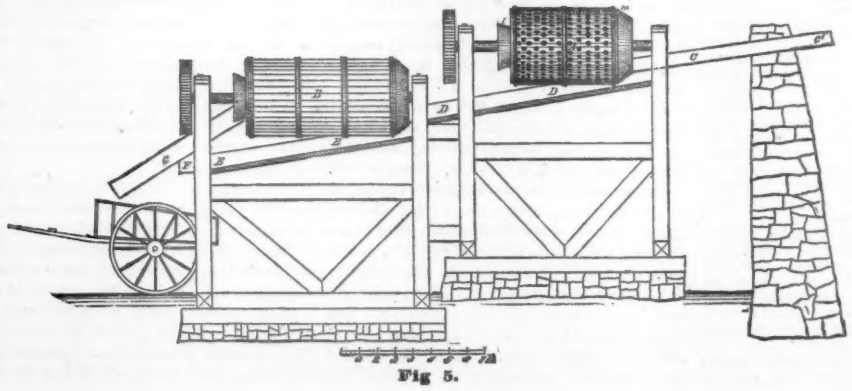


Fig 5.

Fig. 7 represents the latest form of blowing engine used in the furnaces of the Salisbury region. *A B* are the blowing cylinders, which are operated by an overshot waterwheel, *C C*. The cylinders, one of which is shown in sections in fig. 8, are made of wood staves, like a barrel, and with cast-iron heads, which are fastened together with long iron bolts or rods, extending from one head to the other. This form of engine is very cheap, and for the low pressures employed works very satisfactorily.

The furnaces which we have described are all worked under separate management, but all of these are controlled at Lime Rock, which is the headquarters of the organization of which Hon. Wm. H. Barnum is the chief. Careful accounts are kept in each, of the expenses and cost of production, and a healthy emulation is thus established between the separate furnaces.

Next week we will give a description of the iron manufactured at these furnaces, and the purposes for which it is used.

Radius of Cross-over for Double Track on a Curve.

TO THE EDITOR OF THE RAILROAD GAZETTE:

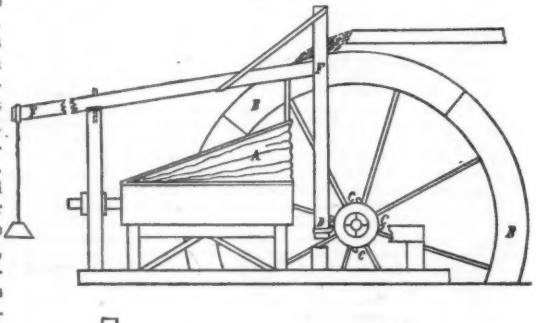
Allow me to submit the following solution of a problem in the last number of the *Gazette*:

If the cross-over is to be a simple reversed curve there is but one radius that will fulfill the conditions.

Let *a e* and *b d* be the centre lines of the two tracks, and *a f d* that of the cross-over. From the data given we will have

$c_1\ d = r_1 = 806.104$ ft.
$c_1\ a = r_2 = 793.896$ "
$c_1\ p = 800$ "
$p\ q = 175$ "

Fig 3.



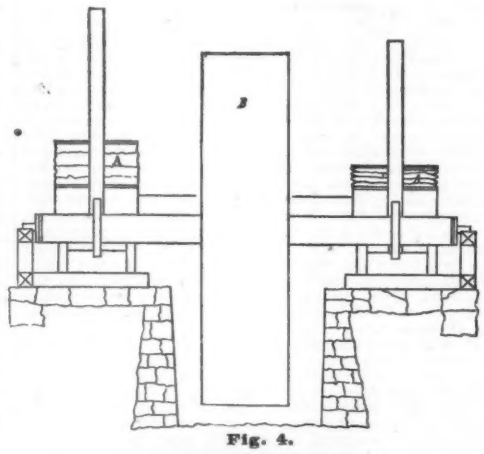


Fig. 4.

$c_2\ f = f\ c_3 = \rho$

$$\text{Sin. } \tfrac{1}{2} c_1 = \frac{\tfrac{1}{2} p\ q}{c_1\ p} = 0.109875,$$

From which

$c_1 = 12°, 39', 30''.$

$\text{Sin.}^2\ \tfrac{1}{2} c_1 = 0.011963,$

and

$\cos.^2\ \tfrac{1}{2} c_1 = 1 - \text{sin.}^2\ \tfrac{1}{2} c_1 = 0.988037$

Also in the triangle $c_1\ c_2\ c_3$ we have

$c_1\ c_2 = r_1 - \rho$
$c_1\ c_3 = r_2 + \rho$
$c_2\ c_3 = 2\ \rho$

and from trigonometry (see Chauvenet's Eq. 265), where the sides *a* and *b* and

the angle C of a triangle are given to find the side c,

$$c = (a+b)\sqrt{\left[1-\frac{4\,a\,b\cos.^2 \tfrac{1}{2}C}{(a+b)^2}\right]}$$

which becomes in this case

$$2\,\rho = \left\{(r_1-\rho)+(r_2+\rho)\right\}\times \sqrt{\left\{1-\frac{4\,(r_1-\rho)\,(r_2+\rho)\cos^2 \tfrac{1}{2}c_1}{(r_1-\rho+r_2+\rho)^2}\right\}}$$

This reduces to the form

$$\rho^2+\frac{(r_1-r_2)\cos.^2 \tfrac{1}{2}c_1}{1-\cos.^2 \tfrac{1}{2}c_1}\times\rho=\frac{(r_1+r_2)^2-4\,r_1\,r_2\cos.^2 \tfrac{1}{2}c_1}{4\,(1-\cos.^2 \tfrac{1}{2}c_1)}$$

A simple quadratic equation in ρ and known quantities. Substituting in this the values of r_1, r_2 and $\cos.^2 \frac{1}{2}c_1$, and reducing, we have $\rho^2 + 1008.5\,\rho = 645{,}056.5821$, which solved gives $\rho = 444.08$ feet. The angles c_2 (exterior) and c_3 may now be readily found and consequently the arcs $a\,f$ and $f\,d$.

On a curve of 444.08 ft. radius, the deflection from the tangent for a chord of 50 ft. is 3°, 13′, 40″. Lay off $a\,f = 35$ ft. by a proportionate deflection, and then $f\,d$, preferably by 50 ft. chords, a distance of 144 ft.

D. W. HERING.

JOHNS HOPKINS UNIVERSITY, BALTIMORE, Md., Oct. 29, 1877.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I send you herewith solution of question under above head in issue of Oct. 26.

If the radius of the reverse curve be drawn in the figure there given, we will have a triangle formed in which we know all of the sides algebraically. That is: Let s=distance between tracks=7.5; g=gauge of track=4.7; R=radius of main track =800 feet; r=radius of turnout—to determine; AB=chord of main track=175 ft.

If we call the angle formed by the radii drawn in figure A, we would then have for the side opposite it a=2 r. The right-hand side or b would be=R−r+½s+½g. The left-hand side or c would be=R+r−½s−½g.

Substitute in the trigonometrical formula

$$\text{sin. } \tfrac{1}{2}\,A=\sqrt{\frac{(s-b)\,(s-c)}{b\,c}}$$

when s=½ (a+b+c), or in this case s would=R+r, and we obtain

$$\text{sin. } \tfrac{1}{2}\,A=\sqrt{\frac{(2\,r-\frac{1}{2}\,s-\frac{1}{2}\,g)\,(\frac{1}{2}\,s+\frac{1}{2}\,g)}{(R-r+\frac{1}{2}\,s+\frac{1}{2}\,g)\,(R+r-\frac{1}{2}\,s-\frac{1}{2}\,g)}}$$

$$=\sqrt{\frac{(4\,r-s-g)\,(s+g)}{(2\,R-2\,r+s+g)\,(2\,R+2\,r-s-g)}}$$

Again, as found in any work on railroad curves:

$$A\,B=2\,R\text{ sin. }\tfrac{1}{2}\,A.$$

Therefore, numerizing,

$$175=1600\sqrt{\frac{(4\,r-12.2)\,12.2}{(1612.2-2\,r)\,(1587.8+2\,r)}}$$

Squaring both sides, clearing of fractions, and solving the resulting quadratic equation,

$$r=443.24\text{ feet},$$

which is somewhere between a 12° 50′ and 13° curve. Ans.

T.

COVINGTON, Va., Oct. 29, 1877.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I give below a solution of the problem in your last number, viz.: To find the radius of cross-over for a curved double-track road.

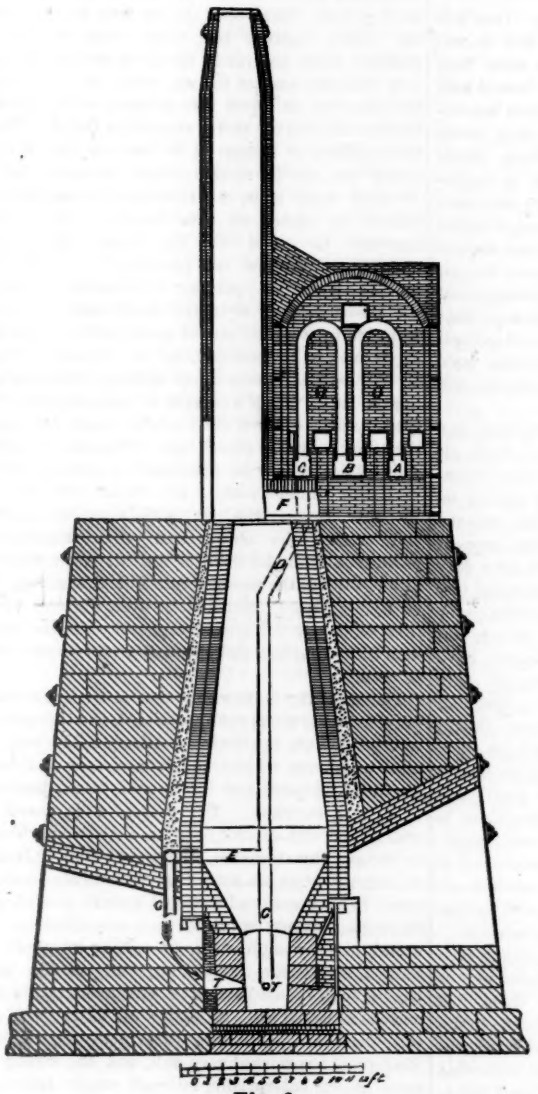


Fig. 6.

The radius required is evidently the radius of the centre of the track of the cross-over. This being found, the radii of the interior and exterior rails are found by diminishing and increasing respectively the radius of the centre by 2 ft. 4¼ in.

The tracks being of 4 ft. 8½ in. gauge and 7½ feet apart between the outer rail of one and the inner of the other, we have

S P (see figure) = 7 ft. 6 in. + 4 ft. 8½ in. = 12 ft. 2½ in. = 12.208½ ft

We have

C A = C B = 800 ft.; chord A B = 175 ft.

The radius and chord being given we have consequently the angle $c''\,c\,c'$, which we shall put equal to z, its value in this case being 12° 34′.

Let c', c'', be assumed as centres of the turn-over $c''\,o$, $c'\,o'$ and $c'\,P$ equal to each other equal the radii. It is required to find the value of these equal radii and hence the position of the centres c', c''.

Put the required radii

$c''\,o$, $c'\,o$, $c'\,P$ each equal to r.

Put

c P = 800 ft. + 3 ft. 9 in. + 2 ft. 4½ in.=806 ft. 1½ in.=806.1041⅔ ft. = R.

Put

c o = 800 ft. − (3 ft. 9 in.+2 ft. 4½ in.)=793 ft. 10½ in.=793.8958⅓ ft. = a.

We have

$c\,c'' = a + r$; $c'\,c'' = 2\,r$; $c\,c' = R - r$; $c\,H = (a+r)\cos.\,z$.

We have

$$c'\,H = (a+r)\cos.\,z = R - r.$$

Now

$$c\,c''^2 = c\,c'^2 + c'\,c''^2 + 2\,(c\,c' \times c'\,H).$$

That is,

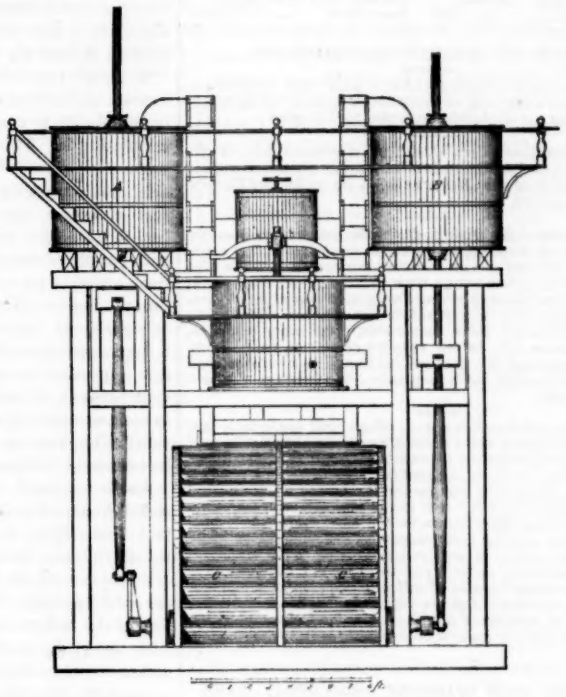


Fig. 7.

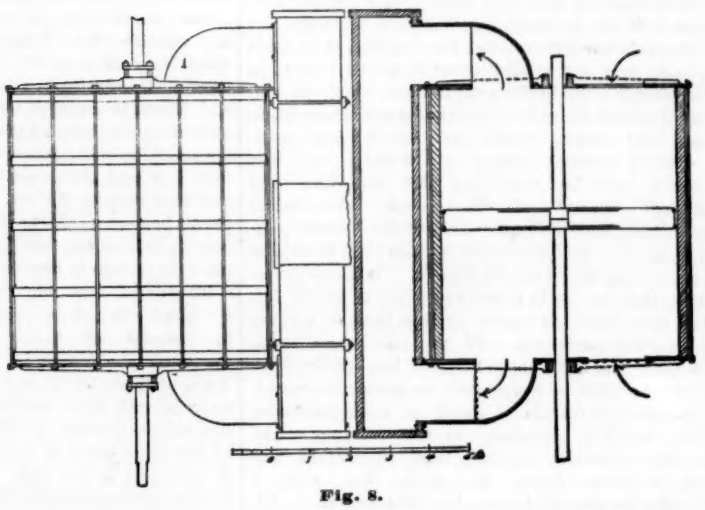


Fig. 8.

$$(a+r)^2 = (R-r)^2 + (2\,r)^2 + 2\,(R-r\,[(a+r)\,(\cos.\,z)+r-R].$$

Expanding

$$a^2+2\,a\,r+r^2 = R^2 - 2\,r\,R + r^2 + 4\,r^2 + 2\,a\,R\cos.\,z + 2\,r\,R\cos.\,z + 2\,r\,R - 2\,R^2 - 2\,a\,r\cos.\,z - 2\,r^2\cos.\,z - 2\,r^2 + 2\,r\,R.$$

$$\frac{a^2+R^2-2\,a\,R\cos.\,z}{2} = r^2 - r^2\cos.\,z + r\,R + r\,R\cos.\,z - a\,r - a\,r\cos.\,z.$$

$$= (1-\cos.\,z)\,r^2 + (1+\cos.\,z)\,r\,R - (1+\cos.\,z)\,a\,r.$$

$$\frac{a^2+R^2-2\,a\,R\cos.\,z}{2\,(1-\cos.\,z)} = r^2 + \frac{1+\cos.\,z}{1-\cos.\,z}\,r\,R - \frac{1+\cos.\,z}{1-\cos.\,z}\,a\,r$$

$$= r^2 + \left\{\frac{1+\cos.\,z}{1-\cos.\,z}\right\}(R-a)\,r$$

Squaring the equation by adding ¼ square coefficient of r and taking the root, we have

$$r = -\frac{1+\cos.\,z}{2\,(1-\cos.\,z)}\,(R-a) + \sqrt{\left\{\frac{1+\cos.\,z}{2\,(1-\cos.\,z)}\right\}^2 (R-a)^2 + \frac{a^2+R^2-2\,a\,R\cos.\,z}{2\,(1-\cos.\,z)}}$$

By substituting for R, a and cos. z their values, we find

$r = 443.4181$ ft.; $(r+a) = c\,c'' = 1237.3139$ ft.; $R - r = c\,c' = 362.686$ ft

The interpretation of the equation will of course give a geometrical construction of the problem; but it is not simple and consequently I did not send it, but will do so if the proposer requires it.

D. SHANAHAN.

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Editorial Announcements.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Addresses.—*Business letters should be addressed and drafts made payable to* THE RAILROAD GAZETTE. *Communications for the attention of the Editors should be addressed* EDITOR RAILROAD GAZETTE.

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

VENTILATING AND WARMING RAILROAD CARS.

"The melancholy days have come" when hot stoves in railroad cars are generally regarded as a necessity; but fresh air, unfortunately, is not. The impulse which leads all animals, men and women included, to seek warmth in cold weather is undoubtedly a natural one, which the conditions of animal life make necessary for self-preservation; because cold means death, and life is only possible with a certain degree of warmth, so that it should not be surprising that the first and peremptory demand of the people who travel is that the cars shall be kept "comfortable," which generally means that the temperature in them shall be kept at somewhere between 60 and 90 degrees. It is also probably true that any one in robust and vigorous health suffers less from breathing impure air than those do who are more delicately organized. We may take as an illustration or analogy of this a steam boiler of large dimensions, in which the draft is temporarily or partly obstructed. With an abundant margin of power or steam-producing capacity, such a drawback to its working would hardly be observed, or at least it would not prevent it from doing its work, but with a small boiler the case would be quite different. If the latter is subjected to even a slight impediment, such as the obstruction of the supply of air, it would fail to perform its duty. Now, without presenting any very profound physiological laws, it will be observed that when people with weak respiratory or digestive organs are exposed to the influence of impure air they are at once injuriously affected by it. As a gentleman who suffers from the direful effects of dyspepsia sometimes remarks, he has a poor fire-box and is obliged to use good fuel and have a plentiful supply of fresh air in order to make steam. He gives this as a reason for living at the best hotels, and, when he can avoid it, never assumes the risk of breathing impure air. It has also been noted that people inclined to have weak lungs always have a very acute sense of smell, which is interpreted to mean that, as breathing impure air would be exceptionally dangerous to them, nature has provided this keen sense in order to enable them to detect such danger as early as possible. Any one who has had opportunity to observe must have noticed that the lower class of foreigners who come to this country, and have generally very robust health, will live in an atmosphere which would almost produce asphyxia if persons of more delicate constitution were to breathe it. Then, too, allowance must be made for habit. Any one soon becomes accustomed to the vilest smells. A tanner or soap-boiler will live and thrive in odors that would nauseate those unaccustomed to them. People who use tobacco also accustom themselves to breathe an atmosphere in which the worst impurities are made insensible by the smoke of the noxious weed. It is also tolerably well established that the habitual use of tobacco blunts both the senses of taste and smell, so that one of the penalties which the devotees of that sort of incense must pay, is that the danger flag, which nature has provided to warn us all against the siroccos of impure air, becomes heavy and languid.

There is also another class who stand in mortal terror of "drafts," and so habitual does this feeling become with many people that it finally degenerates into the feeling that all fresh air is *raw*, and therefore dangerous to breathe, and should be cooked in some way before it is inhaled. This latter class are hopeless. Neither experience, science nor the advice of doctors will enlighten them.

It is therefore not surprising that it is so difficult to secure good ventilation when there are such strong influences which must be overcome and which resist the admission of fresh air into railroad cars.

There are two ways of meeting this difficulty. One is to arrange the heating apparatus in such a way that it will be impossible to warm the car without at the same time ventilating it. This can be done if the car is heated with warmed air, that is by taking fresh cold air from the outside and warming it by passing it through some sort of heater like the Spear stove, and then admitting it into the car. In order to keep up a continuous supply of heat there must be a continuous current of fresh air taken from the outside and warmed and admitted into the inside. This of course displaces an equal amount of vitiated air, and in this way the atmosphere in the car is kept approximately pure. With such an arrangement it is impossible to warm the car without at the same time ventilating it, so that the instinct which leads all animals to seek warmth will also be efficacious in securing good ventilation, because with the system named, the one will be impossible without the other.

Another method of overcoming the active resistance and stolid inertia which oppose the admission of fresh air is to embody in the apparatus used some kind of educational feature; that is, the apparatus itself should be self-explanatory, so that every person in going into the car would perceive what it is for. A very large proportion of the persons who travel in railroad cars have very little knowledge of what the ventilators are intended for, and another, perhaps equally large, proportion have never grasped the idea that air may be cold and yet be very impure. The only notion which most brakemen have about ventilators is, that their purpose is only to regulate the temperature of cars; that is, when the car gets too warm the ventilators should be opened, and when it gets too cold they should be closed. There is a soul of truth in this error, but the brakemen do not understand the true part. Fewer ventilators are needed in cold weather than in warm, because there is then a greater difference between the temperature inside and that outside the car, and therefore the movement of the air is more rapid than it is when the temperatures are more nearly equal, but just as much air should be supplied for persons to breathe in cold as in warm weather.

If railroad cars are ventilated in winter, then it must be done either with the consent or in defiance of those who travel in them. If the warm air system is adopted it can be done in defiance of them, but if any other is employed it must generally be with their consent. In cases where somewhat complicated systems of ventilation have been used, printed directions, given at some length, have been posted up at each seat in the cars. These, however, usually fail, because they presuppose that the traveler will read them, which he does not always do, and that if he does he will understand what they mean, which is not always the case, and that if he does it will lead to some rational reflection, which, alas! is very hard to effect. For these reasons directions to passengers, if they are anything more than of the simplest character, seldom do any good.

The danger of partial knowledge has passed into a proverb. The obstacles which it interposes in the way of effecting good ventilation are almost or quite as difficult to overcome as those presented by gross ignorance or indifference. There are a great many people who can perceive the difference between pure and impure air, and who within certain limits realize the importance of ventilation, but who are quite ignorant of the mechanical process by which it is effected. The ordinary idea which prevails among many people, some of them of very great intelligence, is that all that is required in order to ventilate an apartment of any kind is to make an opening near the ceiling so as to allow the impure air to escape. With this idea nearly all the railroad cars in the country are provided with rows of ventilators, as they are called, near the top, through which the impure air is expected to escape without any provision being made to admit an equal supply of fresh air. Fortunately, perhaps, the air will not act as it is expected to: if it did the passengers would at times find themselves attempting existence in a partial vacuum.

The ignorance on the part of master car-builders and superintendents of railroads with reference to this one point is one of the chiefest difficulties in the way of effecting good ventilation. They do not realize that to keep the air pure there must be adequate provision for *admitting* a sufficient quantity from the outside. It is very easy to get rid of the foul air if we only admit enough that is pure, just as we can overcome bad habits easily if we only acquire enough good ones to take the places of those which it is desirable to exterminate. The question of most importance is, how shall the requisite quantity of pure air be admitted into railroad cars. Now, without any intention of attributing to inanimate things any such motives as desire or intention, it may yet be said that if we found that the air was rushing violently against any part of a car, it would indicate a purpose or inclination, or whatever else we may choose to call it, on the part of the air to enter the car at that place. If, on the other hand, we found that at other places the air flowed past the car, or away from it, very rapidly, the indication would be that it had no impulse to enter at these points. Now, what are the facts of the case? The air rushes against the front ends of the cars, or perhaps more accurately the front ends of the cars rush very violently against the air, while the one glides past the other at an equal rate of speed on the sides, and at the rear end the car moves away from the air. This being the condition of things, it is obvious that the place at which the air is most inclined to enter the cars is at their front ends, and therefore the supply ventilators should be placed in this locality. If therefore an aperture is made at the front end, either by opening a window or providing a movable sash in the door, or putting a ventilator in the end of the raised roof or over the front window, the fresh air will rush in at a high rate of speed, and if a similar opening is made at the rear end, or at the ceiling, the impure air will escape. There is no difficulty whatever in effecting the latter; but if a current of cold air enters, it is very apt to cause a sense of chilliness to some passengers, and then the opening is closed and the pure air is excluded. This difficulty may be overcome by placing the supply ventilator immediately in front of the stove. By this means the air which enters passes over and around the stove, and thus becomes partly warmed and mingles with the hot air about the stove before it reaches the passengers. For this reason a supply ventilator placed immediately over the end window in front of the stove is one of the most effective, and at the same time simplest and cheapest arrangements which can be used.

The difficulty is, however, that if such ventilators are provided their use is not appreciated, and they are apt to be left closed. On the Boston & Albany road a very effective plan, which was we believe first proposed in these pages, has been adopted, and has several times been referred to in our columns. The ventilator is closed with a sash glazed with colored or ground glass on which is cut, by the sand blast process, the inscription, "IF YOU WANT TO BREATHE PURE AIR KEEP THIS VENTILATOR OPEN." This seems to be just the educational feature needed in a ventilating apparatus, and it has been very effective. No one would, even by implication, be willing to admit that he wanted to breathe impure air, and as the statement has a sort of authoritative character it is to some extent accepted as a matter of faith, with the result that the ventilators are generally kept open. This plan has worked very well, and the wonder is that some of our enterprising railroad supply dealers do not furnish ventilators of this kind. So far as ventilation is concerned, the same result may be effected by simply opening the front window and closing the blind. In that case the slats of the blind direct the current of air upwards over the stove, but it lacks the educational feature which the inscription on the glass provides, the importance of which is nearly always overlooked, and which we have found it difficult to impress upon those who exercise authority over such matters. The inscription is as important as the ventilator itself, because without the former the latter is not kept open, whereas with this instruction kept constantly before their eyes, the passengers are led to use the ventilators as they are intended to be used.

The Fall Grain Movement.

There has been a great deal said of the large crops of wheat harvested last summer and of the heavy grain movement which has followed. Most comparisons, however, have been made with the movement of last year only, which suffices to show how much better business is this year than last, but does not much help to prove whether this year's business is absolutely large. To do this we need to look back several years. Hitherto the great grain year has been that following the harvest of 1873, which we have often referred to as having saved this country, and especially the railroads, from an enormous aggravation of the financial calamities of that year, which as they were

seemed almost unendurable. There had never before been so large a crop, and, prices being high and money greatly in demand, the movement of grain was large without precedent. There have been one heavy and two lighter crops since, but that of 1873 has remained unsurpassed hitherto. Therefore we do not go back of that year in making our comparisons, below, which are of the movement of grain of the current crop year, thirteen weeks of which are reported.

The grain movement since July has been, for five years (Aug. 5 to Nov. 3):

	1877.	1876.	1875.	1874.	1873.
Lake ports' receipts	74,260,796	51,935,735	57,429,240	57,559,727	65,339,364
Lake ports' shipments	61,324,809	52,693,278	49,613,590	40,621,324	55,047,485
Atlantic ports' receipts	66,845,531	45,971,112	49,810,324	38,784,077	49,035,529

Compared with last year we have an increase of 43 per cent. in the receipts and 16 per cent. in the shipments of the Northwestern markets, and of 45 per cent. in the receipts at the sea-board, but last year there was a light wheat crop to move. But if we go back and make the comparison with the phenomenal year 1873, when the fall movement was much greater than ever had been known before, we find an increase of 14 per cent. in the receipts and of 11½ per cent. in the shipments at Northwestern markets, and of no less than 36 per cent. in the receipts at the seaboard.

Thus the fall movement this year has been decidedly greater than ever before in the history of the country. The receipts at the seaboard especially have been greater. Ordinarily we might suppose that this would mean a light winter movement. We would interpret it as indicating that the crop had been hurried forward while navigation was open to take advantage of the low water rates. But if this were so, there would be large accumulations of stocks somewhere. Careful records of the stocks "in sight," that is, reported in store at any market, or in transit, are kept and published, and these show that there is *less* grain on hand at lake and seaboard ports than there was last year at this time. Neither is there any accumulation in Great Britain, whither our heavy exports have gone. The explanation is, first, that Europe was unusually bare of grain when the new crop was harvested, and it had to be hurried forward in unusual quantities to supply the current consumptive demand; and, second, the other chief sources of supply, California and Russia, have not been able to contribute their usual quota. The fact that there are no large stocks now accumulated in Great Britain and on our seaboard, and that the closing of the Baltic harbors by ice will soon cut off the Russian supply, make it altogether probable that the heavy fall movement will be followed by a heavy winter movement, which of course must be wholly by rail. An active winter business for the railroads at the rates which can be commanded this year will give them larger profits than they have had since 1873–74, when there was perhaps the most profitable winter business that American railroads have ever enjoyed, though it was chiefly the grain carriers which enjoyed it.

Wire Gauges.

At the last meeting of the American Institute of Mining Engineers a report was made by a committee, which was appointed at a previous meeting, to consider this subject. This committee consisted of Mr. T. Egleston, Mr. Wm. Metcalf and Mr. Jos. D. Weeks.

Some weeks ago, in a review of Mr. D. K. Clark's "Manual for Mechanical Engineers," we called attention to the variety of standards for wire gauges in use in England and other countries. Perhaps the most common gauge in use is what is known as the Birmingham wire gauge. This Clark says "is a scale of notches in the edge of a plate, of successively increasing or decreasing widths, to designate a set of arbitrary sizes or diameters of wire, ranging from about half an inch down to the smallest size easily drawn, say, four-thousandths of an inch. * * The principle, if there is any, on which it was originally constructed is not known." Clark then gives seven other wire gauges, the numbers of which all differ more or less in size. Besides these he gives three French wire gauges. Sir Joseph Whitworth introduced his wire gauge in 1857. It commences with the smallest size and increases by thousandths of an inch up to half an inch. The sizes are designated or marked by their respective numbers in thousandths of an inch. One or more wire gauges of American origin are also in use, we believe, in this country.

The committee to whom this subject was referred make no mention of this diversity in the standards of gauges, but call attention chiefly to the inaccuracy of most of the gauges in use. These they divide into two general classes, first, *fixed*, and second, *movable* gauges.

The fixed gauges consist of a steel plate either made with slots open at one end, the sides of which are intended to be parallel, with round holes and sometimes with a plug to fit the holes, or of a V either cut into a plate of steel or of two bars placed together.

These fixed gauges were found to be only approximately correct. Not only those made by different manufacturers did not agree, but in those made by the same manufacturer there were often "very perceptible and annoying differences."

Two kinds of movable gauges are described, "sliding callipers with verniers, and with or without a micrometer screw for adjustment, and the micrometer screw gauge."

The latter is spoken of as the simplest form, and is recommended for adoption as the standard gauge.

The committee, very wisely we think, recommend the abandonment of the fixed gauges, and the practice of designating dimensions and sizes by numbers—meaning number "wire gauge," as it is often written—for commercial use, and the adoption of the system of expressing signs in thousandths of an inch or fractions of a millimeter. There is probably nothing to prevent any one from doing the latter, in this country, if they choose, but at present the use of doing so is not apparent.

It is to be hoped, however, that the barbarous old wire gauges will be condemned to the scrap-heap, and that the more accurate and precise micrometer gauges will take their places, and that instead of designating wire and plates as such a number "wire gauge," which instead of being precise is quite the reverse, the practice of expressing such dimensions in thousandths of an inch will come into universal use.

Grain Receipts at Atlantic Ports.

The direct shipments of grain by rail from the Northwest this fall have not at any time been very large, though until the advance of the rate to 40 cents per 100 from Chicago to New York they were about as large as they had ever been at the season when the rates were high enough to be profitable. For the past few weeks, however, the through rail shipments have been decidedly light, though the total shipments continue quite large. As usual, when the movement is chiefly by water, New York has got most of the grain—a considerably larger proportion than it got last year, when the rail rate was as low as the water rate. A further influence in favor of New York has been the large wheat movement. Philadelphia and Baltimore have of late years done an enormous business in corn, the latter last year exporting more of that grain than New York, but they never have had a large wheat trade. The wheat goes chiefly to New York, and especially does the spring wheat of Wisconsin and Minnesota, which now forms a large proportion of the grain marketed. Last year there was a very light wheat movement, and a very large corn movement. This year the wheat movement is unusually heavy, but the corn movement is now comparatively light. Thus there are two causes tending to promote the grain receipts of New York more than those of the ports further south. First, the difference between rail and water rates, which makes New York the market reached at least cost; and, second, the unusually large crop of the grain which is always marketed chiefly in New York.

The receipts of grain of all kinds at the different Atlantic ports for the 29 weeks since navigation opened, from April 15 to Nov. 3, have been, in bushels, for the past two years:

	1877 Bushels.	1877 Per cent. of total.	1876 Bushels.	1876 Per ct. of total.
New York	53,946,001	50.5	50,428,953	46.1
Boston	7,986,500	7.5	8,531,825	7.8
Portland	371,814	0.3	979,918	0.9
Montreal	11,793,728	11.0	11,110,058	10.2
Philadelphia	13,341,609	12.5	20,052,875	18.3
Baltimore	15,475,990	14.5	15,562,335	14.2
New Orleans	3,932,578	3.7	2,746,760	2.5
Total	106,848,220	100.0	109,412,724	100.0

The total quantity marketed is about the same this year as last, there having been heavy spring and light fall receipts last year, and light spring and heavy fall receipts this. But New York, Montreal and New Orleans have received more this year than last, and New York's proportion of the whole has risen from 46.1 to 50.5 per cent. Baltimore nearly holds its own, but Philadelphia has lost very largely, receiving only two-thirds of the quantity which it had last year, while its proportion of the whole has fallen from 18.3 to 12.5 per cent—that is, it falls back to about the position held by it previous to 1876.

Not only was the quantity moved small last spring, but until July a large proportion of it was carried by rail at the extremely low rates of last year, on contracts made while the railroad war was raging. That made the movement abnormal. It is since that time that there has been a return to the ordinary condition of things, with the railroads charging considerably more than the lake and canal rate. We therefore make up another table, partly to show the distribution of grain under such rates, and partly to indicate them ovement of the new large crop, which began to come forward about the first of August.

For the 13 weeks since July (Aug. 5 to Nov. 3), the distribution has been as follows:

	1877 Bushels.	1877 P. c.	1876 Bushels.	1876 P. c.
New York	35,779,415	53.5	20,992,891	45.9
Boston	4,874,421	7.3	3,923,171	8.6
Portland	159,250	0.2	275,100	0.6
Montreal	8,091,950	12.1	5,110,696	11.1
Philadelphia	8,408,119	12.6	8,042,725	17.6
Baltimore	8,234,300	12.3	6,563,000	14.3
New Orleans	1,366,076	2.0	864,545	1.9
Total	66,913,531	100.0	45,772,128	100.0

First of all we note the heavy movement. In the last 13 weeks this year the total receipts have been 65 per cent. greater than for the 16 weeks preceding; last year the receipts of the first 16 weeks were 40 per cent. greater than those of the 13 weeks following. Putting it differently, the average receipts per week at the seaboard were:

	1877.	1876.
16 weeks April 15 to Aug. 4	2,495,918	3,977,637
13 weeks Aug. 4 to Nov. 3	5,147,195	3,530,933
Total 29 weeks	3,684,421	3,772,853

In looking to the proportions arriving at the different ports, we find that during the past 13 weeks of extraordinarily active movement, with rail rates varying from 18 to 24 cents a bushel for wheat from Chicago to New York, against 12 to 19 cents by lake and rail, New York has received 53.5 per cent. of the total, against 45.9 per cent. last year, while the percentages of Baltimore and Philadelphia together have fallen from 31.9 last year to 24.9 this year. Last year these two cities took two-thirds as much as New York; this year considerably less than half as much.

It is not at all likely, however, that New York will maintain its position after navigation closes. In the first place it will not then have the advantage of cheaper rates than any other port; and then, the country in the Ohio valley and in that latitude will begin to market this year's corn crop in the course of a few weeks, and this corn goes chiefly to Baltimore and Philadelphia, while the country which supplies most of the corn to New York begins to market its crop later. There is, however, likely to be a heavy wheat movement throughout the winter, and this makes it probable that New York will maintain the highest rank among the grain receivers, which sometimes it has not done in the winter when nearly all the grain moving was corn, and most of the corn came from farms not further north than the latitude of St. Louis.

The Petroleum Traffic as Affected by the Recent Combination.

The movement of petroleum since September deserves a particular examination, because on the first of October a new tariff was made by the railroads, accompanied by some sort of an agreement which is supposed to distribute the traffic among the four trunk lines, and so give back to the Pennsylvania Railroad a share of this important business which for some months it had been deprived of largely. The cessation of shipments over the Pennsylvania, as we have seen, was accompanied by an enormous increase of the exports at New York. It was natural to ascribe this to the diversion of the traffic formerly carried over the Pennsylvania Railroad to the Erie and the New York Central & Hudson River. And, the Pennsylvania having again secured a share of the traffic, it is interesting to see how far New York and Philadelphia receipts are affected. We have no reports of receipts, but only those of exports. The quantity in gallons exported from each port, and its percentage of the total exports, are given below, for the five weeks from Sept. 30 to Nov. 3:

	1877. Gallons.	1877. Per cent.	1876. Gallons.	1876. Per cent.
New York	26,790,001	68.3	13,604,748	61.8
Boston	353,090	0.9	340,853	1.5
Philadelphia	6,685,995	17.0	5,340,523	24.2
Baltimore	5,416,918	13.8	2,754,951	12.5
Other ports	9,668	....	.....	....
Total	39,255,672	100.0	22,041,075	100.0

Philadelphia has thus a much lower percentage of the exports than it had last year; but it nevertheless did much better in October than for many months previous. The percentages of total exports made from each port for the ten months ending with October, compared with those for October of this year, for instance, were as follows:

	Ten months.	October.
New York	71.4	68.3
Boston	1.3	0 9
Philadelphia	12.9	17.0
Baltimore	12.3	13.8
Other ports	2.2	....
Total	100.0	100.0

The average exports per month at all ports this year have been 30,812,635 gallons, so that the October exports were nearly 25 per cent. above the average. But Philadelphia's receipts in October were more than 80 per cent. greater than its average receipts for the nine months previous. It has thus gained notably since the agreement among the carriers went into effect. As the figures are for exports only, which must have been to a considerable extent of petroleum which had already arrived when the month opened, this increase may not measure the whole increase in the petroleum business at Philadelphia.

The gain is made at the expense of New York and Boston—chiefly of New York; for Baltimore also gains, as was to be expected, since Baltimore as well as Philadelphia is a terminus of the Pennsylvania Railroad.

Record of New Railroad Construction.

This number of the *Railroad Gazette* contains information of the laying of track on new railroads as follows:

Pittsburgh, Wheeling & Kentucky.—The first track is laid from Holliday's Cove, W. Va., south to Wellsburg, 10 miles.

Minneapolis & St. Louis.—Extended from Waseca, Minn., southward to Albert Lea, 33 miles, completing the road.

This is a total of 43 miles of new railroad, making 1,867 miles completed in the United States in 1877, against 1,981 miles reported for the corresponding period in 1876, 1,128 in 1875, 1,594 in 1874, 3,228 in 1873, and 5,982 in 1872.

THE "PACKING SEASON," conventionally so called, begins with November and ends with February, as formerly nearly all the hogs butchered for market were packed in freezing weather.

There was thus afforded a very large provision traffic to the railroads at the time when navigation was closed, and rates were higher than during the summer. Recently, however, there has been a great increase in the summer packing, which has distributed the business more evenly through the year. The receipts of live hogs at Chicago, for instance, was greater by 31 per cent. during the eight months ending with October last, than they were during the four months previous—the "packing season" proper. The receipts are by no means a gauge of the packing, but during the eight months referred to Chicago packed 1,470,000 hogs, out of 2,241,000 received, which is more than its winter packing, and the total summer packing of the Northwest is reported as about one-half of the total winter packing, and 12 per cent. more than for the corresponding eight months of 1876.

The traffic in hog products is an extremely important one, being one of the largest sources of revenue during the winter for railroads from the Northwest to the sea-board. The prospect for the season is thus worth investigating. According to the reports of State Auditors in the seven states which chiefly supply hogs for distant markets, there were at the last assessment about 21 per cent. more hogs on hand than at the same time in 1876, 10 per cent. more than in 1875, and about 3 per cent. less than in 1874. Prices are comparatively low this year, which will promote consumption more largely than low prices for grain, bread being a necessary and meat only a luxury of life to many Europeans. But on the other hand the moderate prices will tend to preserve large stocks among the farmers, especially as they have this year good returns from grain, which renders them, as a whole, comparatively independent. Further, the larger summer packing is likely to reduce by so many the number coming forward during the winter. Allowing for that, however, it is probable that the winter packing will be larger than last year, and nearly as great as has ever been recorded.

According to the State Auditors' reports, there has been an increase of stock in every one of the packing States—more than 100 per cent. in Kansas and Nebraska, 20 per cent. in Iowa, 19 in Ohio, 16½ in Missouri, 12½ in Indiana, and 11 per cent. in Illinois.

RAPID TRANSIT ROADS seem to take advantage of every opportunity to establish themselves in New York, for since the recent decision of the Court made it possible to go on, work has been prosecuted, in some places with great activity, both on the New York Elevated's east-side line and on the Gilbert Elevated's Sixth avenue line, the latter having a force at work night and day. Where so recently there was no means of traveling from Wall street to Central Park faster than horses could travel, there seems likely to be in a few months three steam railroads, all within a belt a mile wide, the Third avenue line of the New York Elevated being just a mile from its Ninth avenue line, and the Sixth avenue line of the Gilbert Elevated just half-way between them. The question then will no longer be, how people can get up and down town in the city of New York, but how the three railroads can get traffic enough to support them. The experience with the present line—the Ninth avenue line—though it has had about as much traffic as it could carry without a double track, does not indicate that it is likely to become a mine of wealth to its owners until there is a larger population west of it and north of its present terminus, and the Gilbert Elevated will be sure to take a very large share of its present traffic if equal accommodations are afforded. The Ninth avenue line, however, is not well situated for a heavy traffic, being too far to one side of the centre of population and business, being especially of little use to those who go shopping from their houses up town to the Broadway retail stores. Both the Sixth avenue and the Third avenue lines are well situated for commanding this travel, the former serving conveniently a large, wealthy population, and the latter a much larger population, but of poorer people. Either of these lines might be expected to command a very much larger traffic than the existing road, and either should, it would seem, return good profits immediately *if there were no other road.* It is useless to deny, however, that the prospects of all are diminished, because of the number of the lines. When completed there will be no part of the city, except that near the water's edge, where the population is comparatively small, more than a quarter of a mile from an elevated railroad, and New York, from being the worst provided, will become the best provided city in the world with the means of "rapid transit."

LIVE STOCK TRANSPORTATION comes before Congress again in the shape of a bill to reduce the time that cattle may be kept on cars without unloading to feed and water and rest from 28 to 24 hours. This is a delicate matter for Congress to deal with, for it is necessary to make special and costly preparations at the transfer stations, which of course are established in accordance with the current transportation customs; and to shorten the time on the cars requires either a change in the position of transfer stations or an increase in the speed of stock trains, both of which are costly, while the latter would increase risks as well as cost. If the railroad companies should conclude to increase the speed rather than change their transfer stations, that probably would please the shippers, who will be glad to get their cattle through as fast as possible, if they do not have to pay more for it; but then there seems no certainty that the time will not be reduced next year to twenty hours or less. The matter is complicated by the fact that among those urging legislation to reduce the time there are usually sundry persons who own patents for improved stock cars in which the cattle can eat and drink and lie down while in transit, these people being glad to increase the advantages of their cars by the aid of legislation. It is almost always argued that the loss in weight and quality of meat is so great by long journeys and fasts that it is greatly to the advantage of shippers to make them short. If this is so, then no legislation is needed. The shippers are more interested than anyone else can be in treating their animals tenderly.

RUSSIA, in order to secure the construction of many of its railroads, guaranteed a minimum dividend (usually 5 per cent.) on the shares of the companies. The currency of Russia is paper, which has always, or at least for many years, been at a discount. The guaranteed interest, however, has always been paid in coin, in which the stock was subscribed. Since the war began the paper currency has very greatly depreciated and the Government has found it very hard to get money to meet its expenses and obligations. Now it is reported that a ukase has been issued which makes the guaranteed dividends payable in paper—equivalent now to reducing the stockholders' income one half or more.

STEEL RAILS are reported a little higher—the first movement there has been in that direction since 1873. There have been unusually large orders this fall, and but that the capacity for production is in excess of any ordinary demand the prices probably would have advanced two or three months ago. The lowest figures that have been quoted were $40 per ton at Eastern mills, and now $43 to $45 are the quotations.

The Origin of the General Passenger and Ticket Agents' Association.

The following interesting account of the early days of the passenger business is given in a letter from Mr. H. C. Marshall to Mr. S. F. Pierson, and published recently in the *Railway World:*

CLEVELAND, Ohio, Sept. 30, 1877.

S. F. Pierson, Esq.:

DEAR SIR: * * * * * The scenes of those infantile days in ticket business are very fresh in my mind, and if I had the genius to weave them into a story, it would make an interesting book.

Of all the ticket clerks, ticket agents, and general ticket agents (most of us were called something, but not all general ticket agents) that met at the Monongahela House in convention, on the morning of March 13, 1855, but one now remains in the General Ticket Agents' Association, Mr. L. M. Cole, Baltimore & Ohio Railroad.

Previous to the call of this meeting, there was no organized system of the coupon ticket business. Some of the companies were settling by the coupons collected, and some making reports. It was a monthly occurrence to see ticket clerks going from one general office to another, with a traveling bag filled with unpaid coupons, making settlements regardless of sales. The general office of the Cleveland, Columbus & Cincinnati and Cleveland & Erie roads was a kind of clearing house up to the time of the opening of the Ohio & Pennsylvania Railroad to Crestline, and until the opening of the Great Western of Canada, roads east of Erie reported or settled by collection for the full amount due to the roads west of Erie, and the roads south of Columbus and west of Grafton settled with the Cleveland, Columbus & Cincinnati and Cleveland & Erie for business going east of those points. The opening of the Ohio & Pennsylvania and Great Western broke up the clearing-house business, as we could not, from the very nature of the case, have the collections by which to check up reports. The writer felt that something must be done in order to get an understanding with each other, and adopt some general system for the coupon business.

Noticing a call for a general convention of railway managers, to be held at Pittsburgh on the 13th of March, 1855, he concluded it was a good time to call the ticket agents together. The principal reason for having the meeting at this time was that we might have the sanction of the general managers to what we might do. A circular was issued over the names of P. W. Strader, George L. Dunlap, William R. Barr and H. C. Marshall, calling on all the parties interested to attend the meeting. The call was responded to by nearly or all of the roads in the West, and some from New England, Pennsylvania and Maryland.

The meeting was organized by appointing P. W. Strader as President, and William R. Barr as Secretary. Julius Movins, who had served one term in the Michigan Legislature, was general of tactics and showed us how to run our meeting according to Hoyle or some other book. He upset the President by the conundrum: "What are we here for?" As the President had not been consulted, he had no particular idea on the subject, and got out of it by calling on the "north end" for explanations. These seemed satisfactory, and we proceeded to appoint a committee to prepare business for the meeting. This committee was composed of H. C. Marshall, of Cleveland, Columbus & Cincinnati and Cleveland & Erie. Chairman; L. M. Cole, of Baltimore & Ohio Railroad, and L. L. Houpt, of Pennsylvania Railroad. This committee agreed upon a report or platform and reported the same to the convention, and it is worthy of remark that no part of this platform has ever been changed. There was considerable opposition to that part relating to making reports and settling by them, by agents who issued and sold their own tickets and settled by redemption, and also to that part relating to drawing for balances as soon as reports were exchanged. It was quite the fashion for Western roads to make their reports and inclose the currency to pay for them. This currency in New York would be from 3 per cent. to 10 per cent. discount, while the Eastern roads would send checks to balance their reports, said checks being 2 per cent. to 5 per cent. premium in the west. However, the report of the committee was adopted and afterwards approved of by the convention of general managers. Various matters were discussed and plans started to be adopted at some future meeting. The idea of permanent organization was suggested by Julius Movins, of Great Western Railroad, and the agents were invited to adjourn to Hamilton, Canada, and perfect the organization.

I think the Hamilton meeting was held in the following July. The fame of the Pittsburgh meeting had gone abroad, and a large delegation came together at Hamilton. Most of the time at this meeting was spent in having a railroad social. It was decided that Baltimore would be a better place, and the fall a better time to fix up the constitution and by-laws than the extreme warm weather and location of Hamilton. The organization was fully completed at the third meeting, which was held in Baltimore. It is unfortunate that we have not the records of these meetings. They were burned at Memphis while Myron P. Wheeler was Secretary. I remember the following names as being at the Pittsburgh meeting: P. W. Strader, of the Little Miami Railroad; W. A. Burnett, of the Rutland & Burlington Railroad; James A. Raynor, Michigan Southern; Julius Movins and Chas. E. Noble, Great Western and Michigan Central; Wm. R. Barr, Buffalo and State Line; Geo. L. Dunlap, of Erie; L. L. Houpt, of Pennsylvania; L. M. Cole, Baltimore & Ohio; H. C. Marshall, Cleveland, Columbus & Cincinnati. There were others, but I cannot recall their names. Those whom I have mentioned took an active part in the proceedings, and for a number of years directed and shaped the business of the organization, assisted by new members, of whom were F. R. Myers, C. P. Leland, Wm. P. Johnson. Samuel Powell, J. N. Cary, J. A. Burch, J. Boyd, J. N. Parsons, Major Fifield, Dan Freemyre, and others whom I do not now call to mind. The officers of the Association were elected each year, until the election of a permanent Secretary. The Chairman of the business committee held that position until he was elected permanent Secretary, about 1859 or 1860.

There are various other points of interest in the early history of the Association, such as the first general meeting to adjust the through rates, held at Tremont House, Chicago, in 1857, and then the meetings of the committee who made the first general sheet of divisions of the through rates. While the first job took only five days, the second took three weeks of good hard work.

I send you what I could scratch down this evening. The dates, names and facts may be of interest to you, and the why and wherefore of things may be suggestive. I was greatly interested in the growth of the institution, and did all I could to make it efficient. Strader was always strong in pushing important points, and Houpt was thorough in the details of any business under his care. William A Burnett, of Vermont, was a great help to the Association. His years and experience were far beyond any of us in the West, and he was a man of order in all he did or said.

I would like to see a full history of the Association for the first twenty-five years, and now that so many are alive who took an active part in it, I think the material for the work might be got together in good shape. Yours truly,

H. C. MARSHALL.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

Baltimore & Ohio.—Mr. Wm. H. Trego has been appointed General Superintendent of Express over all the company's lines. Mr. Trego was until recently with the American Express Company.

Brownsville & New Haven.—The purchasers of this Pennsylvania road recently organized a new company by electing the following directors: A. J. Crossland, W. J. Kline, E. H. McClelland, A. L. McFarlane, Thomas Rees, A. O. Tintsman, George W. Wilson. The board elected A. L. McFarlane President.

Central Mississippi.—The directors of this new company, organized by the purchasers of the Mississippi Central at foreclosure sale, are: Wm. Alexander Gordon, James C. Clarke, Pike County, Miss.; R. P. Neely, James Fentress, Bolivar, Tenn.; H. D. Murphy, G. W. Paschall, Fulton, Ky.; Benjamin F. Ayer, Chicago; Stuyvesant Fish, Wm. H. Osborn, New York. The principal office is in New York. Mr. Osborn is President.

Chicago, Burlington & Quincy.—It is reported that no appointment will be made to fill Mr. W. B. Strong's place until after the election next spring, and that Vice- resident Perkins will act as General Superintendent for the present.

Connecticut Central.—At the annual meeting in Broad Brook, Conn., Nov. 8, the following directors were chosen: George Beach, Hartford, Conn.; Edward Buckett, Hazardville, Conn.; E. S. Henry, Rockville, Conn.; H. P. Stedman, East Hartford, Conn; Samuel Stoughton, N. S. Osborn, East Windsor, Conn.; Francis Gowdy, John M. Stiles, J. A. Thompson, Melrose, Conn.; Wm. Birnie, Willis Phelps, Daniel D. Warren, Springfield, Mass. The board elected Daniel D. Warren, President and Treasurer; Francis Gowdy, Vice-President; T. M. Maltbie, Secretary.

Delphos, Bluffton & Frankfort.—The first board of directors has organized by electing officers as follows: President, Carey A. Evans, Delphos, O.; Vice-President, Joseph C. Silver, Bluffton, Ind.; Secretary, Joseph Boehmer, Delphos, O.; Treasurer, Wm. J. Craig, Bluffton, Ind.

Hannibal & St. Joseph.—The new board has elected Wm. Dowd President and Wm. B. Leonard Vice-President. Mr. Dowd is President of the Bank of North America in New York, and Mr. Leonard is a New York broker.

Hannibal & St. Joseph.—In the list of directors chosen last week the name incorrectly reported by telegraph as Julius H. Gaston, should have been Julius Hallgarten, of New York.

Missouri, Kansas & Texas.—Mr. J. H. Sullivan having resigned as Superintendent of the Missouri, Sedalia and Fort Scott divisions, to take effect Nov. 10, the following announcements are made, to be in force upon these divisions from that date and until further notice: Frank Fulton, Trainmaster, will have control of trains and stations; M. C. Kimberly, in addition to his duties as Resident Engineer, will assume charge of the road-bed, track, bridges, buildings and water supply.

Nebraska.—Mr. Percival Lowell is appointed General Freight and Ticket Agent, in place of E. A. Smith, assigned to other duties. Mr. Lowell holds the same position on the Burlington & Missouri River Railroad in Nebraska, to which the Nebraska Railway is now leased.

Rochester & Northern Minnesota.—The first board of directors is as follows: J. V. Daniels, Wm. H. Ferry, Marvin Hughitt, M. M. Kirkman, J. B. Redfield, C. C. Wheeler. The board has elected Wm. H. Ferry, President; Marvin Hughitt, Vice-President; J. B. Redfield, Secretary; M. M. Kirkman, Treasurer.

San Francisco & North Pacific.—At the annual meeting, Oct. 25, the following directors were chosen: T. I. Bergin, Peter Donahue, Arthur Hughes, Edward Martin, Michael Reese. The board re-elected Peter Donahue, President; Michael Reese, Vice-President; P. E. Dougherty, Secretary; Edward Martin, Treasurer.

St. Louis, Kansas City & Northern.—Mr. R. D. Kohn has been elected Treasurer in place of Mr. Walter Katte, who resigned to accept the position of Chief Engineer of the New York Elevated Railroad.

Southwestern, of Kentucky.—The officers of this company are: Z. P. McBrayer, President; C. Williams, Treasurer; S. Davis, Secretary; T. Bell, Attorney; Dr. M. Tabler, Superintendent; Ed. Rorser, Agent; C. K. King, Conductor. The headquarters are at Harrodsburg, Mercer County, Ky.

Southern Pacific.—Mr. Henry R. Judah is appointed Assistant Passenger and Ticket Agent, to date from Nov. 1.

Santa Cruz.—At the annual meeting in Santa Cruz, Cal., Oct. 31, the following directors were chosen: John Brazer, Titus Hale, F. Hageman, F. A. Hihn, R. C. Kirby, B. F. Parker, A. Pray, Sr. The board elected F. A. Hihn President; A. Pray, Sr., Secretary; Titus Hale, Treasurer.

Willamette Valley & Coast.—At the annual meeting in Corvallis, Oregon, Oct. 20, the following directors were chosen: W. B. Hamilton, Jo. Hamilton, J. B. Hinkle, M. Jacobs, Sol. King, A. Pearce, B. W. Wilson, A. N. Witham. The board elected W. B. Hamilton President; B. W. Wilson, Secretary; Thomas Graham, Treasurer.

PERSONAL.

—Mr. Harrison Tweed, for many years and until very recently Agent and Treasurer of the Taunton Locomotive Works, was last week elected a member of the Governor's Council from the First District of Massachusetts.

—Mr. Rufus Blodgett, Superintendent and Master Mechanic of the New Jersey Southern, is elected to the lower house of the New Jersey Legislature from Ocean County.

—Mr. W. W. Sawyer, Superintendent of the St. Croix & Penobscot road, died at his residence in Calais, Me., Nov. 7. His death was caused by paralysis resulting from an injury received on the road last spring.

—Mr. Luke F. Tronson, formerly for many years Master Mechanic of the Morris & Essex Railroad, died at his residence in Newark, N. J., Nov. 9, after several months' illness. Mr. Tronson was 62 years old and retired from his position on the road some two years ago, since which time he has not been actively engaged in business.

—Mr. Foster Blodgett, shortly after the war a prominent Georgia politician, and for several years Superintendent of the Western & Atlantic Railroad, then run by the State, died in Atlanta, Nov. 12. He was last year indicted for corrupt practices in the management of the road, but has never been tried.

—Mr. J. H. Sullivan has resigned his position as Superintendent of the Missouri, Sedalia and Fort Scott divisions of the Missouri, Kansas & Texas Railway.

TRAFFIC AND EARNINGS.

Railroad Earnings.

Earnings for various periods are reported as follows:

	1876—77.	1875-76.	Inc. or Dec.	P. c.
Year ending Sept. 30:				
Connecticut River....	$584,664	$589,537	Dec.. $4,873	0.8
Expenses.....	371,371	382,269	Dec.. 10,898	2.9
Net earnings.....	$213,293	$207,268	Inc .. $6,025	2.9
Earnings per mile.	8,879	10,556	Dec.. 1,677	15.9
Per cent. of exps...	63.52	64.84	Dec.. 1.32	2.0
New York, New Haven & Hartford.....	3,954,060	4,314,682	Dec.. 360,622	8.4
Expenses.....	2,222,577	2,574,061	Dec.. 351,484	13.6
Net earnings.....	$1,731,483	$1,740,621	Dec.. $9,138	0.5
Earnings per mile..	25,844	28,201	Dec.. 2,357	8.3
Per cent. of exps...	56.43	59.66	Dec.. 3.23	5.4
Old Colony.....	2,208,032	2,206,880	Inc .. 1,152	0.1
Expenses.....	1,360,871	1,370,494	Dec.. 9,623	0.7
Net earnings	$847,161	$836,386	Inc .. $10,775	1.3
Earnings per mile..	7,698	8,091	Dec.. 393	4.8
Per cent. of exps...	61.63	62.10	Dec.. 0.47	0.7
Six months ending Sept. 30:				
Santa Cruz.....	$25,624	.....	.....	....
Expenses.....	13,987	.....	.....	....
Net earnings.	$11,637	.....	.....	....
Earnings per mile..	1,114	.....	.....	....
Per cent. of exps...	54.59	.....	.....	....
Ten months ending Oct. 31:	1877.	1876.		
Denver & Rio Grande.	$625,411	$334,451	Inc .. $290,960	87.0
Grand Trunk.....	7,812,898	7,942,235	Dec.. 129,337	1.6
Great Western, of Canada.....	3,273,732	3,431,964	Dec.. 158,232	4.6
Illinois Central, Ill. lines.....	4,209,477	4,565,176	Dec.. 355,699	7.8
Kansas Pacific.....	2,677,518	2,500,181	Inc .. 177,337	7 1
Missouri Pacific.....	3,189,991	3,052,264	Inc .. 137,727	4.5
St. L., Alton & T. H., Belleville Line.....	427,040	395,793	Inc .. 31,247	7.9
St. Louis & San Francisco.....	1,097,668	1,103,174	Dec.. 5,506	0.5
Southern Minnesota .	535,624	509,683	Inc .. 25,941	5.1
Toledo, Peoria & Warsaw.....	925,895	1,212,612	Dec.. 286,717	23.6
Nine months ending Sept. 30:				
Chicago, Burlington & Quincy.....	$8,894,822	$8,791,744	Inc .. $103,078	1.2
Net earnings.....	4,040,534	4,151,619	Dec.. 111,085	2.7
Per cent. of exps...	54.57	52.78	Inc .. 1.79	3.4
Cleve., Mt. Vernon & Delaware.....	281,345	279,312	Inc .. 2,033	0,7
Net earnings.....	59,414	52,173	Inc .. 7,241	13.9
Per cent. of exps...	78.98	81.41	Dec.. 2.43	3.0
Mobile & Ohio.....	1,191,257	1,240,607	Dec.. 49,350	4.0
Nashville, Chatta. & St. Louis.....	1,255,060	1,267,962	Dec.. 12,902	1.0
Net earnings.....	493,015	468,695	Inc .. 24,320	5.2
Per cent. of exps...	60 72	63.03	Dec.. 2.31	3.7
Paducah & Memphis.	134,414	150,173	Dec.. 15,759	10 5
Net earnings.....	41,721	42,389	Dec.. 668	1.6
Per cent. of exps...	69.17	71.86	Dec.. 2.69	3.7
St. Louis, Iron Mt. & Southern..... ...	3,005,230	2,606,047	Inc .. 399,183	15.3
Net earnings.....	1,358,575	984,905	Inc .. 373,670	37.9
Per cent. of exps...	54 80	62.21	Dec.. 7.41	11.9
St. Paul & Sioux City.	349,146	410,609	Dec.. 61,463	15.0
Net earnings.....	96,335	141,178	Dec.. 44,843	31.8
Per cent. of exps...	72.44	65.56	Inc .. 6.88	10.5
Sioux City & St. Paul.	200,580	251,395	Dec.. 50,815	20.2
Net earnings.....	36,794	63,985	Dec.. 27,191	42.5
Per cent. of exps...	81.49	74.66	Inc .. 6.83	9.1
Eight months ending Aug. 31:				
International & Great Northern.....	$861,170	$725,958	Inc .. $135,212	18.6
Net earnings.....	133,209	252,132	Dec.. 118,923	47.2
Per cent. of exps...	84.55	65.27	Inc .. 19.28	29.5
Month of August:				
Erie.....	$1,271,181	$1,267,004	Inc .. 4,177	0.3
Net earnings.....	441,538	423,970	Inc .. 17,568	4.1
Per cent. of exps...	65.27	66.54	Dec.. 1.27	1.9
Galveston, Harrisburg & San Antonio.....	95,779	67 301	Inc .. 28,478	42.3
Month of September:				
Atlantic & Great Western.....	$377,409	$342,767	Inc .. $34,642	10.1
Galveston, Harrisburg & San Antonio.....	110,372	116,248	Dec.. 5,876	5.1
Great Western, of Canada.....	382,500	389,000	Dec.. 6,500	1.7
Net earnings.....	140,700	119,000	Inc .. 28,700	24.1
Per cent. of exps....	63.22	69.42	Dec.. 6.20	8.9
Mobile & Ohio.....	141,762	175,073	Dec.. 33,311	19.0
Month of October:				
Denver & Rio Grande.	$83,157	$46,029	Inc .. $37,128	80.7
Illinois Central, Ill. lines.....	588,367	526,247	Inc .. 62,120	11.8
Kansas Pacific.....	400,625	345,360	Inc .. 55,265	16.0
Missouri Pacific.....	394,972	371,332	Inc .. 23,640	6.4
St. Louis, Alton & T. H., Belleville Line..	61,699	50,977	Inc .. 10,722	21.0
St. Louis & San Francisco	134,632	151,494	Dec.. 16,862	11.1
Southern Minnesota..	110,000	68,359	Inc .. 41,641	60.9
Toledo, Peoria & Warsaw	115,167	137,979	Dec.. 22,812	16.5
First week in November:				
Atchison, Topeka & Santa Fe.....	$75,680	$52,453	Inc .. $23,207	44.2
St. Louis, Iron Mt. & Southern.....	116,800	112,300	Inc .. 4,5 0	4.0
Week ending Nov. 2:				
Great Western, of Canada.....	$94,777	$90,652	Inc .. $4,125	4.5
Week ending Nov. 3:				
Grand Trunk.....	$217,354	$191,246	Inc .. $26,108	13.7

The following are reports made to the Massachusetts Railroad Commission for the year ending Sept. 30, 1877:

	Earnings.	Expenses.	Net earnings.	Earnings per mile.	P. c. of exps.
Boston & Maine.....	$2,267,019	$1,518,854	$748,165	$11,237	67.00
Eastern	2,508,107	1,708,790	799,317	8,894	68.13
New York & New England.....	1,010,336	825,953	184,383	7,269	81.75
Providence & Worcester	910,011	670,315	239,696	13,615	73.66

Coal Movement.

Anthracite coal tonnage for the week ending Nov. 3 was: 1877, 482,214; 1876, 518,166; decrease, 35,952 tons, or 6.9 per cent.

The coal tonnage of the New York State canals from the opening of navigation to Oct. 31 was:

	1877.	1876.	Inc. or Dec.	P. c.
Anthracite	838,378	662,348	Inc .. 176,030	26.6
Bituminous	223,531	263,851	Dec.. 40.320	15.3
Total.....	1,061,909	926,199	Inc .. 135,710	14.7

Of this year's tonnage, 729,471 tons were cleared from tidewater and 332,438 tons from interior ports, against 409,777 and 516,422 tons last year.

The actual tonnage passing over the Pennsylvania & New York Railroad for the eleven months of its fiscal year ending Oct. 27 was:

	1877.	1876.	Inc. or Dec.	P. c.
Anthracite.....	742,374	702,257	Inc .. 40,117	5.7
Bituminous.....	303,814	321,221	Dec.. 17,407	5.4
Total.....	1,046,188	1,023,478	Inc .. 22,710	2.2

Coal shipments from Pictou, N. S., for the ten months ending Nov. 3 were 141,593 tons, of which 20,332 tons went to the United States.

Petroleum Exports.

For the ten months from Jan. 1 to Nov. 3 the exports of petroleum have been, in gallons:

From—	1877.	1876.	1875.	1874.
New York.....	220,039,476	120,356,758	128,403,380	133,865,407
Boston.....	3,669,005	2,446,799	2,297,504	3,235,533
Philadelphia.....	39,730,156	55,156,116	55,904,342	65,929,715
Baltimore.....	38,012,873	32,549,421	22,989,644	5,282,706
Richmond.....	4,881,289	.....	.....	.....
Portland.....	1,402,456	.....	.....	.....
Norfolk.....	391,100	.....	.....	.....
Total.....	308,126,355	210,509,094	209,596,870	208,253,361

The exports this year are thus 46⅛ per cent. greater than ever before, and this vast increase occurs after the export trade had been almost stationary for four years.

The increase of New York exports was 83 per cent.; the decrease of Philadelphia exports, 28 per cent. The percentages of the total exported at the three leading ports have been:

	1877.	1876.	1875.	1874.
New York.....	71.4	57.3	61.2	64.3
Philadelphia.....	12.9	26.2	26.6	31.6
Baltimore.....	12.3	15.5	11.0	2.5

On Nov. 11 and 12, no less than 33 steamers, each with a tow of barges, left Pittsburgh, carrying 146,320 tons of coal. Of this shipment 56,320 tons were bound for Cincinnati, 84,000 tons for Louisville and 6,000 tons for Madison, Ind.

Canal Traffic.

The canal traffic out of Buffalo for the month of October and the ten months ending with that month is reported as follows.

October:	1877.	1876.	Inc. or Dec.	P. c.
No. boats cleared..	1,400	748	Inc .. 652	87.0
Tolls collected....	$98,165 06	$98,216 54	Dec.. $51 48	....
Ten months:				
No. boats cleared..	5,970	4,202	Inc .. 1,768	42.1
Tolls collected....	$407,192 15	$513,997 28	Dec.. $106,805 13	20.8
Shipments—				
Grain, bush.....	42,340,000	24,479,000	Inc .. 17,861.000	72.8
Lumber, ft.....	74,961,000	50,150,000	Inc .. 24,811,000	49.5
Shingles, No.....	20,748,000	16,782,000	Inc .. 3,966 000	23.6
Staves, lbs.....	81,121,000	46,677,000	Inc .. 34,444,000	73.8
Pork and lard, lbs.	16,662,000	....	16,662,000	....

There is little of this traffic which the railroads get in ordinary years, except pork and lard, and the whole amount of the shipments of these was but 8,331 tons, or 833 car-loads, the freight on which by rail from Chicago would have been not more than $70,000.

Grain Movement.

Receipts and shipments of grain of all kinds for the week ending Nov. 3 are reported as follows:

	1877.	1876.	Inc. or Dec.	P. c.
Lake ports' receipts.....	5,071,098	4,308,747	Inc .. 762,351	17.7
" " shipments	3,827,013	3,902,672	Dec.. 75,659	1.9
Atlantic ports' receipts...	5,435,919	4,010,805	Inc .. 1,425,114	35.5

Of the lake ports' shipments 15⅓ per cent. were by rail this year against 60⅓ in 1876, 25¼ in 1875, and 12 per cent. in 1874.

Of the receipts at Atlantic ports, 60 per cent. arrived at New York, 11.2 at Montreal, 10.6 at Philadelphia, 10.2 at Baltimore, 5.3 at Boston, 2.6 at New Orleans, and 0.1 at Portland.

For the ten months from Jan. 1 to Nov. 3 receipts and shipments were, grain in bushels and flour in barrels:

Flour:	1877.	1876.	Inc. or Dec.	P. c.
Lake ports' receipts....	3,986,427	4,558,757	Dec.. 572,330	12.6
" " shipments.	4,210,655	3,965,424	Inc .. 245,231	6.2
Atlantic ports' receipts	6,546,113	8,175,428	Dec.. 1,629,315	20.0
Wheat:				
Lake ports' receipts....	42,456,413	47,431,528	Dec.. 4,975,115	10.5
" " shipments.	36,608,405	42,528,579	Dec.. 5,920,174	13.9
Atlantic ports' receipts	34,987,896	36,459,270	Dec.. 1,471,374	4.0
Corn:				
Lake ports' receipts....	70,278,566	72,289,793	Dec.. 2,011,227	2.8
" " shipments .	62,534,904	68,399,608	Dec.. 5,864,704	8.6
Atlantic ports' receipts	74,033,552	76,295,639	Dec.. 2,262,087	3.0
All Grains:				
Lake ports' receipts....145,146,721	151,443,244	Dec.. 6,296,523	4.2	
" " shipments..122,017,362	134,007,356	Dec..11,989,994	9.0	
Atlantic ports' receipts.133,913,948	140,260,397	Dec.. 6,346,449	4.5	

The movement of all grains for the ten months for five years past has been:

	1877.	1876.	1875.	1874.	1873.
Lake ports' receipts....145,146,721	151,443,249	131,852,542	153,867,105	146,077,900	
Lake ports' shipments.122,017,362	134,007,356	109,233,629	118,129,653	118,259,096	
Atlantic p'rts receipts....133,913,948	140,260,397	116,054,860	123,374,242	106,640,821	

The movement of the current year, though exceptionally light until August, is now about equal to the average of the four years previous, and was never equaled before 1873.

The Salt Lake *Herald* notes a shipment made by a grain merchant of that city of 1,000 tons of Utah wheat to San Francisco. The wheat was bought along the line of the Utah Central and Southern roads between Ogden and Payson, at an average price of 84 cents per bushel. The shipments were all made within 40 days, the Central Pacific allowing a considerable rebate for that time.

San Francisco wheat exports for October were 995,978 bushels against 3,432,540 bushels in October, 1876, a decrease of 2,436,562 bushels, or 71 per cent.

Water Rates.

There has been little change in either lake or canal rates during the last week, quotations being from 4 to 4¼ cents for wheat and half a cent less for corn from Chicago or Milwaukee to Buffalo, until Tuesday last, when 4¼ for wheat was given. These are very low rates for the season, as most of the vessels now leaving Chicago will make but one trip more, and the dangers from storms are great.

By canal the rates have not varied much from 9¾ cents per bushel for wheat, 8⅛ for corn, and 5⅛ for oats from Buffalo to New York.

Ocean rates have been lower. Last Tuesday prices made by steam from New York to Liverpool were 7⅛d. to 7¼d. per bushel for grain, 32s. 6d. per ton for bacon, 7-32d. per pound for cotton. A shipment of grain to Havre by steam is reported at 20 cents gold per bushel, and provisions at 50 cents per 100 lbs. Grain by sail to Cork for orders was taken at 6s. 9d. and 7s. 3d. per quarter—equivalent to 19¼ to 21 cents a bushel of 60 lbs.

THE SCRAP HEAP.

Railroad Manufactures.

The Missouri Furnace at South St. Louis (Carondelet) is to go into blast soon.

It is reported that the Union Pacific Company has bought 10,500 tons of steel rails in Chicago at $48 per ton.

During the year ending Oct. 31 the Cambria Iron Works, at Johnstown, Pa., made 75,127 tons of Bessemer steel ingots.

The Pittsburgh *Manufacturer* reports nearly all the iron works of that city in operation with a fair amount of orders. Prices are generally reported very low and profits small.

The Phœnix Iron Co. has finished the construction, and is now putting up in place, ten iron bridges on the line of the Quebec, Montreal, Ottawa & Occidental Railway, of Canada. The dimensions of each of the bridges are as follows: Six spans of 120 feet each and one draw 130 feet, four spans of 160 feet, one span of 129 feet, five spans of 215 feet, five spans of 50 feet, five spans of 100 feet, seven spans of 150 feet and five spans of 200 feet. The work was commenced in February and has been progressing ever since.

The Moselem (Pa.) Furnace is being repaired and relined, in preparation for a new start.

Eckert Brothers are building a new blast furnace in Reading, Pa., on the Weimer plan.

The contract for the new South End bridge over the Connecticut River at Springfield, Mass., has been awarded to the Leighton Bridge & Iron Works, of Rochester, N. Y., for $45,700.

The Boston & Albany Company has put Safford's car coupler on 30 freight cars, for the purpose of giving it a full and careful test in daily use.

The Springfield (Ill.) Iron Co. has the contract for the iron rails for an extension of 30 miles of the Junction City & Fort Kearney road in Kansas.

The rod mill of the Cleveland Rolling Mill Co. on Oct. 12 turned out 51,030 pounds of No. 4 wire rods in nine hours' work.

The Farist Steel Works, at Windsor Locks, Conn., have started up with a small force, which is to be increased gradually. The steel made is for locomotive and car springs.

The Philadelphia *Times* reports that the Baldwin Locomotive Works have just entered into a contract with the Russian Government to build 150 first-class locomotives. Other accounts say that the order is for 44 engines, and that the terms are not satisfactory, Russian bonds being offered in payment. An agent is said to have been sent to Russia for further negotiations.

The new blast furnace now being built at the Pennsylvania Steel Works, at Baldwin, Pa., will, it is said, be the largest in the United States. It will be completed by next January.

An agent of the Russian Government is reported to be in Philadelphia for the purpose of contracting for the construction of a bridge 2,100 feet long, in one span, over the Danube. It is said that the Government is willing to pay $3,000,000 for the bridge, if it can be finished by spring.

The St. Charles (Mo.) Manufacturing Co. has an order for 100 box cars for the Kansas Pacific road.

The National Locomotive Works of W. H. Baily & Co., at Connellsville, Pa., recently shipped a 16-ton narrow-gauge engine and have nearly completed three other narrow-gauge engines and one of standard gauge.

The American Bridge Co., of Chicago, has taken a contract to build a permanent pier for the Atchison Bridge over the Missouri, in place of the one lately undermined by the river; also for a span of iron truss bridge to replace the present trestle approach to the bridge.

The Court has finally ordered the sale of the works of the Milwaukee Iron Co. on petition of the creditors. The total indebtedness of the company is about $520,000. The sale will take place in December.

The Baltimore & Ohio Railroad Company, it is said, will offer to lease its rolling mills at Cumberland, Md.

The Oswego Furnace in Clackamas County, Oregon, the only blast furnace on the Pacific coast, has been sold by the old company to the firm of Seely, Brown & Creighton.

The Missouri Car & Foundry Co., at East St. Louis, has recently received a large order for cars.

The Kellogg Bridge Co., at Buffalo, N. Y., has a contract for a double-track iron bridge of three fixed spans, 178 feet each, and a draw span of 187 feet, over the Maumee River, at Toledo, O., for the Lake Shore & Michigan Southern road; also for three bridges for the Chicago & Northwestern. The company has also concluded other contracts for some 2,000 tons of bridge work, besides several smaller railroad bridges.

Railroad Heroism.

The Fort Scott (Kansas) *Monitor* describes this remarkable instance of presence of mind: "When M. V. Donley, Superintendent of Bridges on the Fort Scott and Leavenworth, Lawrence & Galveston roads, fell from the scaffolding at the Marmaton bridge disaster, a distance of 68 feet, he had the presence of mind and almost superhuman nerve, notwithstanding his broken bones and lacerated limbs, to say, 'Flag No. 1, boys!' and so saved the express train that was thundering around the curve but half a mile away."

The Boston *Transcript* says: "Edward Dixie, the engineer killed in the late Franklin accident on the New York & New England Railroad, is said to have remarked to his physician before dying, that his first impulse at the time of the accident was to jump from the train. Then he thought of those on board the cars, the women and children also, and he resolved to stand at his post."

Fast Time.

One day last week the north-bound limited express from Washington reached West Philadelphia considerably behind time. To make up that time the run of 88½ miles from West Philadelphia to Jersey City was made in one hour and 48 minutes, or at the rate of 49.17 miles per hour. The 33 miles to Trenton are said to have been run in 32 minutes. This train makes two stops, at Trenton and Newark.

Compressed Air Motor for Street Railroads.

Messrs. Robert Harder, John James and James G. Cooper have recently had built at the Wright Steam Engine Works, at Newburg, N. Y., a street car which is to use compressed air as a motive power. It is said that the car will soon be tried in New York.

Tests of the Cincinnati Southern Bridge Over the Ohio River.

The great bridge over the Ohio River for the Cincinnati Southern Railroad is now completed and was formally tested Nov. 8, with very satisfactory results. The bridge consists of ten spans, five of which, including one draw span, the great channel span and three other fixed spans, are over the river and five over the streets and houses on the Cincinnati side of the river. The five river spans were built by the Keystone Bridge Co., the five shore spans by the Baltimore Bridge Co. The spans all rest upon masonry piers, one pier alone being of iron upon a masonry base. The river piers rest on the bed rock, the shore piers upon pile foundations. The bridge is a high one, the distance from top of rail to low-water mark being 105⅝ feet; from top of rail to the high-water mark of 1832, 43 feet. The total cost of the bridge was about $700,000.

The channel span, the longest span of truss bridge in America, is 515 feet between centres of end piers. The trusses are 51⅓ feet deep, and are divided into 20 panels of 25¾ feet each.

There are two trusses, 20 feet between centres. The piers upon which this span rests are respectively 110 and 119 feet high, and are 11 by 26 feet under the coping; both rest upon the bed rock. The tests made are reported as follows:

No. of test.	Span.	Length of span, feet.	Dead weight per foot, in pounds.	Rolling load.	Weight of rolling load, in pounds.	Deflection of east truss, in inches. Under load.	Deflection of east truss, in inches. Permanent.	Deflection of west truss, in inches. Under load.	Deflection of west truss, in inches. Permanent.
2	No. 1....	110	1,258	Two locomotives, coupled.	234,000	0 11-16	0 1-16	0 11-16	0 3-32
3	Sou. half of draw	185	2,161	Four locomotives, coupled.	413,000	0⅝	0 1-16	Not	taken
4	Nor. half of draw	185	2,161	Four locomotives, coupled.	413,000	0⅝	0 1-16	0⅛	0 1-16
5	Whole draw..	Nor. 185 / Sou. 185	2,161 / 2,161	8 v'n locomotives, coupled.	780,000	0⅝ / 0 11-16	0 1-16	0⅛	0 1-16
6	Channel span..	519	5,393	8 v'n locom's copl'd and 4 flat cars lo'd'd	966,000	2 3-32	0 1-16	2	0
7	No. 4....	300	2,484	Six locomotives, coupled.	680,000	1⅝	0	1 9-16	0 1-16
8	No. 5....	300	2,467	Six locomotives, coupled.	680,000	1 9-16	0	1⅛	0
9	No. 6....	190	1,444	Four locomotives, coupled.	416,000	1⅛	0 1-16	1 3-16	0
10	No. 7....	190	1,536	Four locomotives, coupled.	416,000	0 13-16	0	1	0 1-16
11	No. 8....	190	1,536	Four locomotives, coupled.	416,000	0 13-16	0 1-32	1	0 1-16
12	No. 9....	118	1,151	Two locomotives, coupled.	228,000	0 9-16	0 1-32	0⅝	0 1-16
13	No. 10..	113	1,147	Two locomotives, coupled.	228,000	0 7-16	0	0⅝	0 1-16
14	Channel span..	519	5,393	Two locomot's and 4 loaded flat cars at 25 miles per hour..	393,000	0 3-16	0	1 3-16	0

On spans Nos. 7 and 8 the track is on a three-degree curve; on Nos. 6 and 9 the track is on the same curve for part of each span.

Romance of a Sleeping Car.

It was in the Cedar Rapids sleeper. Outside, it was dark as the inside of an ink bottle. In the sleeping car, people slept.

Or, tried it.

Some of them slept, like Christian men and women, peacefully and sweetly and quietly.

Others slept like demons, malignantly, hideously, fiendishly, as though it was their mission to keep everybody else awake.

Of these, the man in lower number three was the "boss." When it came to a square snore with variations, you wanted to count "lower three" in, with a full hand and a pocket full of rocks.

We never heard anything snore like him. It was the most systematic snoring that was ever done, even on one of those tournaments of snoring, a sleeping car. He didn't begin as soon as the lamps were turned down and everybody was in bed. Oh no. There was more cold-blooded diabolism in his system than that. He waited until everybody had had a little taste of sleep, just to see how good and pleasant it was, and then he broke in on their slumbers like a winged, breathing demon, and they never knew what peace was again that night.

He started out with a terrific

"Gn-r-r-r-t!"

That opened every eye in the car. We all hoped it was an accident, however, and trusting that he wouldn't do it again, we all forgave him. Then he blasted our hopes and curdled the sweet serenity of our forgiveness by a long-drawn

"Gw-a-h-h-h-hah!"

That sounded too much like business to be accidental. Then every head in that sleepless sleeper was held off the pillow for a minute, waiting, in breathless suspense, to hear the worst, and the sleeper in "lower three" went on, in long-drawn, regular cadences that indicated good staying qualities.

"Gwa-a-ah! Gwa-a-a-h! Gahwahwah! Gahwahwah! Gahwa-a-a-ah!"

Evidently it was going to last all night, and the weary heads dropped back on the sleepless pillows and the swearing began. It mumbled along in low, muttering tones, like the distant echoes of a profane thunder-storm. Pretty soon "lower three" gave us a little variation. He shot off a spiteful

"Gwock!!"

Which sounded as though his nose had got mad at him and was going to strike. Then there was a pause and we began to hope he had either awakened from sleep or strangled to death, nobody cared very particularly which. But he disappointed everybody with a guttural

"Gurooch!"

Then he paused again for breath, and when he had accumulated enough for his purposes he resumed business with a stertorous

"Kowpf!"

That nearly shot the roof off the car. Then he went on playing such fantastic tricks with his nose and breathing things that would make the immortal gods weep, if they did but hear them. It seemed a matter incredible, it seemed an utter, preposterous impossibility that any human being could make the monstrous, hideous noises with its breathing machine the fellow in "lower three" was making with his. He ran through all the ranges of the nasal gamut, he went up and down a very chromatic scale of snores, he ran through intricate and fearful variations until it seemed that his nose must be out of joint in a thousand places. All the night and all night through he told his story.

"Gawoh, gurrrh! gn-r-r-r! Kowpff!! Gawawwah! gawahhah! gwock! gwarrt! gwah-h-h-h! whoof!

Just as the other passengers had consulted together how they might slay him, morning dawned, and "lower number three" awoke. Everybody watched the curtains to see what manner of man it was that had made that beautiful sleeping car a pandemonium. Presently the toilet was completed, the curtains parted, and "lower number three" stood revealed.

Great heavens!

It was a fair young girl, with golden hair and timid, pleading eyes, like a hunted fawn's!—*Burlington Hawkeye.*

Old Steel Rails for Car Sills.

The *National Car-Builder* for November says: "Mr. George Richards, Master Mechanic of the Boston & Providence Railroad, has recently built two gondola cars in which old steel rails are used for longitudinal sills. He also contemplates building a flat car for carrying lumber, and a merchandise box car upon the same plan. Four 30 ft. rails, weighing 57 lbs. to the yard, are used in each of the two cars already built. They are placed tops down, with strips of plank bolted to their flanges as a foundation for the floor. The bolts are three feet apart, and the floor planks are spiked to the strips in the usual way. The transom timbers are bolted to pieces of iron riveted to the web of the rails and bent around underneath their reversed tops, so as to secure a complete bearing from floor to transom. The end-sills are of oak, in which recesses are made with pocket castings inserted in them for the reception of the rail ends. These are held to the sills by forked bolts riveted to the web of the rails, and passing through the sills and castings. There are four longitudinal truss-rods 1¼ in. in diameter. The drawing attachments are put in as easily and as cheaply as in a wooden floor-frame, and the entire construction is quite simple and free from difficulty.

"One of the completed cars weighs 17,270 lbs., and the other 18,750 lbs., with sidings, and they have carried 34,630 and 43,550 lbs. of coal respectively. Their length over end-sills is 30 ft. 11 in."

Tests of Steel Boiler Plate.

The following are official tests of steel boiler plate manufactured by the Fort Pitt Steel Works of Reese, Graff & Woods at Pittsburgh:

Specimen No.	Dimensions at point of rupture.	Actual breaking weight.	Tensile strength per sq. in.	Remarks.
1	0.94×0.25 in.	20,300 lbs.	86,386 lbs.	Hard
2	0.94×0.25 "	19,900 "	84,680 "	"
3	0.94×0.25 "	19,400 "	82,553 "	"
4	0.94×0.245 "	18,800 "	81,632 "	"

The record is from the office of the United States Local Inspector of steam vessels at Pittsburgh.

An Infernal Machine.

On Nov. 1 as John Decker, station baggage-man at Utica, N. Y., and Doc. Clough, train baggage-master on the Atlantic express, were handling trunks in the gentle and careful way in which baggage is always treated at stations, a very innocent looking trunk was passed out of the car. Just as it touched the platform and Decker had caught hold of the handle, a loud explosion was heard and the air was full of pieces of trunk, torn clothing, papers, and, the bystanders for a moment supposed, fragments of baggageman as well. When the air cleared, however, Decker was seen standing with a trunk handle still in his hand, and no one was hurt but a by-stander who was bruised by a flying piece of trunk. The contents of the trunk were not dynamite or nitro-glycerine as at first supposed, but some innocent looking machines known as "Decker's Universal Burglar Alarm."

Beef, Butter and Cheese Exports.

During the six months from May 1 to Nov. 2, the exports of butter and cheese from New York have been 93,761,633 lbs. against 63,326,176 lbs. for the corresponding period last year, the increase being nearly 50 per cent. The exports this year were equivalent to 4,688 full car-loads, indicating average arrivals for export during the season of nearly 30 car-loads daily.

The exports of fresh beef for the ten months from Jan. 1 to Nov. 2 from all points were 92,680,615 lbs. this year, against 19,990,895 last, showing an increase of 363⅛ per cent. This year 80 per cent. of the exports were from New York, and 17⅛ per cent. from Philadelphia. A little mutton also was exported this year. Exports of live animals were 19,599 cattle this year and 12,410 sheep.

A Large Steam Hammer.

A 74-ton steam hammer, which is claimed to be the largest yet built, was started for the first time at the great Creuzot Works in France, on Sept. 24. It has been two years in construction and works very successfully. It has been built at Creuzot, from the designs of M. Schneider and his engineers, and is intended for use chiefly in forging armor plates for war vessels.

OLD AND NEW ROADS.

Burlington, Monmouth & Illinois River.

Work on the grading of this road was begun last week at Monmouth, Ill. Only a short section has been finally located, as the company has not yet decided whether to run the line by way of Berwick or by Galesburg.

Central, of New Jersey.

The plan of reorganization has been made public and the assent of security-holders to it will shortly be asked. It provides in the first place for a Purchasing Committee, consisting of Robert Lenox Kennedy, John Edgar Johnson, John S. Kennedy and Theodore Drier, of New York, and Edwin M. Lewis, of Philadelphia. This committee is to carry out the plan without a foreclosure if possible, or to foreclose either the blanket mortgage or the consolidated mortgage, as may be judged best. In any event they are to purchase the road and to convey it to a new company to be organized by them and known as the New Jersey Central Railroad Company. This new company is to execute a mortgage covering an issue of $25,000,000 new 7 per cent. bonds bearing interest from Jan. 1, 1879, and to issue $35,000,000 stock, of which $14,000,000 shall be 8 per cent. preferred stock (dividends not cumulative) and $21,000,000 common stock. The preferred stockholders alone will have votes until they have received a full 8 per cent. dividend in one year, and no new lien is to be put on the property without the consent of two-thirds of this stock. The new company is to continue the present lease of the Lehigh & Susquehanna road and to assume the guarantee of the $2,310,000 bonds of the Lehigh Coal & Navigation Company secured on that road; it is to assume the contracts with the North Pennsylvania and the Delaware & Bound Brook companies, and the lease of the New York & Long Branch road.

As to the present securities, the $5,000,000 first-mortgage bonds and the $600,000 Newark & New York bonds will remain, and an equal amount of the new bonds will be set aside for their payment. The present consolidated bonds will be exchanged for the new bonds. The present stockholders will be required to pay an assessment of $10 per share, and will receive 10 per cent. of their present holdings in preferred and 90 per cent. in common stock of the new company also preferred stock for the assessment. Holders of American Dock & Improvement Company bonds will be offered preferred stock in exchange for their bonds and holders of unsecured claims common stock. American Dock & Improvement bonds surrendered are to be held by trustees, who shall apply the interest thereon to the purchase of the preferred stock issued in their place.

In case of foreclosure under the blanket mortgage the Committee is to sell the stock and bonds which would otherwise have gone to bondholders not assenting to the plan, and apply the proceeds to paying them their *pro rata* share of the proceeds of the sale. In case the agreement is carried out without foreclosure, bondholders not assenting will derive no benefit. In any event assents to the plan are not to be binding unless holders of at least $5,000,000 of the consolidated bonds agree to it. All the overdue coupons up to Jan. 1, 1879, are to be deposited with the Committee, and preferred stock will be issued for them. Any unissued balance of securities will go into the treasury of the new company. Brown, Shipley & Co., London, are constituted the agents of the Purchasing Committee in England.

With regard to the Lehigh & Wilkesbarre Coal Company, the Purchasing Committee is authorized to arrange for the payment of all debts secured by pledge of bonds in 12 equal quarterly payments; also to reorganize that company by foreclosure or otherwise, in such manner that all its stock and bonds, except the liens prior to its consolidated mortgage, shall, after the payment of the debts mentioned above, be the property of the New Jersey Central Railroad Company. In case, however, the bondholders of the Lehigh & Wilkesbarre Coal Company and the American Dock and Improvement Company decline the terms offered, their refusal is not to prevent the execution of the rest of the plan.

The amount of the new company's securities required is stated as follows, with the annual interest charge:

	Amount.	Interest.
First-mortgage bonds, 7 per cent.	$5,000,000	$350,000
New consolidated bonds, 7 per cent.	20,000,000	1,400,000
Lehigh Coal & Nav. bonds assumed, 6 per cent., gold	2,310,000	138,600
Lehigh & Wilkesbarre Coal Co. prior liens at 7 per cent. about	4,500,000	315,000
Total bonded debt	$31,810,000	$2,203,600
Preferred stock for two years' coupons on consolidated and convertible bonds, with interest	2,996,000	239,680
Preferred stock for Am. Dock & Improvement bonds	3,000,000	240,000
Preferred stock for 50 per cent. of $5,230,000 Lehigh & Wilkesbarre consolidated bonds	2,615,000	209,200
Preferred stock for cash assessment and 10 per cent. present common stock	4,120,000	329,600
Total preferred stock	$12,731,000	$1,018,480
Common stock for 25 per cent. of Lehigh & Wilkesbarre consolidated bonds	1,307,500	.....
Common stock for unsecured debts, about.	500,000	.....
Common stock for 90 per cent. of present stock	18,540,000	.....
Total common stock	$20,347,500	.....
Total of all securities and of interest and preferred dividends	$64,888,500	$3,222,080

That is, the new company must earn after Jan. 1, 1879, $2,203,600 net to keep out of bankruptcy and $3,222,080 net to pay dividends on the preferred stock. The $600,000 Newark & New York bonds are probably included above under the head of consolidated bonds. The net earnings reported since the lease of the Lehigh & Susquehanna road are: 1876, $3,188,469; 1875, $3,282,910; 1874, $4,449,930; 1873, $4,665,782; 1872, $4,236,806; 1871, $3,035,235. From these sums, however, there must be deducted one-third of the gross earnings of the Lehigh & Susquehanna road paid as rental, and the sums paid as rental for the South Branch road and the Long Branch Division. These rentals were $923,275 in 1876 for the Lehigh & Susquehanna, and $59,898 for the other roads, leaving the net earnings $2,205,296, or just enough to pay interest on the bonded debt.

By the last report the Central owned 104.17 miles of road and 282.20 miles of track. Deducting the Lehigh Coal & Navigation loan assumed and the Lehigh & Wilkesbarre bonds as not a direct lien on the Central road, the proposed capital account would be at the rate of $195,330 common stock, $122,214 preferred stock and $239,992 bonds per mile, in all $557,536 per mile of road, or $205,806 per mile of track owned.

It is reported that holders of over $2,000,000 of the Lehigh & Wilkesbarre Coal Company's bonds have formed a combination to protect their interests, and that they intend to foreclose the mortgage and acquire control of the property, with a view to leasing or selling it to any of the anthracite companies, which may offer them favorable terms.

Central Vermont.

The Vermont & Canada Company has served formal notice on the managers of the Central Vermont Company, warning them to make no payments except such as are warranted by a strict construction of the compromise decree or agreement of 1864. This is one of the first results of the recent decision of the Supreme Court.

Columbus & Toledo.

A new freight line known as the Cincinnati & Toledo Line has been organized to run over this road and the Little Miami between Cincinnati, Toledo and points in Canada and Michigan.

Chicago & Alton.

This company is asking its stockholders to give their consent to a guarantee of bonds to be issued by the Kansas City, St. Louis & Chicago Company, for the purpose of building a railroad from Mexico, Mo., to Kansas City, 160 miles. The new road is to be leased to the Chicago & Alton when built, and will complete its Missouri line according to the original intention.

Chippewa Falls & Northwestern.

A proposition has been made to build this road from Chippewa Falls, Wis., northwest through Vanville to Barron, some 50 miles, provided a county subsidy can be secured.

Chesapeake & Ohio Canal.

On Nov. 12 a heavy land-slide occurred in the east approach to the tunnel near Cumberland, Md., filling up the prism of the canal and breaking the lock gates and flumes. The damage done is heavy and will take, it is thought, at least ten days to repair. It is possible that it may close navigation for the season, especially if cold weather should set in.

Cleveland, Tuscarawas Valley & Wheeling.

Work is now actively in progress on the extension of this road from Uhrichsville, O., on the Ohio River at Bridgeport, opposite Wheeling. The heaviest work on the line is a tunnel near Flushing, through the dividing ridge between the valleys of Stillwater and Wheeling creeks. This ridge is chiefly of slate, and there are long cuts to be made at each end, besides the tunnel itself. At the west end the cut has nearly reached the mouth of the tunnel, and work on the excavation will soon be begun and will be carried on day and night. The contractor for the tunnel is Mr. E. Darragh, and Mr. P. J. Keegan has the contract for the east approach.

Dividends.

Dividends have been declared as follows:

Connecticut River, 4 per cent., semi-annual, payable Jan. 1, 1878.

Boston & Providence, 3 per cent., semi-annual, payable Nov. 15.

Eastern Counties.

Work on this Nova Scotia line has been quietly in progress through the summer, and now about three-fourths of the earthwork and nearly as much of the masonry are completed. Bridges with stone piers are being built at Barney's, Sutherland and French rivers. The work is well done and has been approved, as far as completed, by the Government engineers. On the road as finally located the heaviest grade will be 79.2 feet to the mile, and the sharpest curve six degrees. There has been some opposition to the final location of the line by local interests, and there has also been much complaint of injury to private property by the location and of failure to pay land damages as promised.

Erie.

Judge Donahue, of the New York Supreme Court, ordered to be entered on Nov. 7 a decree of foreclosure of the second consolidated mortgage, at the suit of the Farmers' Loan & Trust Company, trustee. The decree enumerates the prior mortgages as follows: First, $2,482,000; second, $2,174,000; third, $4,852,000; fourth, $2,937,000; fifth, $709,500, and first consolidated, $16,656,000, being $29,810,500 in all. The order authorizes the trustee to abandon leasehold claims and interests on notice to the Referee: appoints George Ticknor Curtis Referee to sell the road; directs the Referee to make the sale in New York city and for cash, but authorizes the reception of bonds and coupons at their *pro rata* value as cash, in case the road is

bought by the bondholders. A sale to the representatives of the bondholders is authorized, provided they make the highest bid. The sale is also to be made subject to the Receiver's debts, and is partly dependent on decrees to be granted in the concurrent suits in New Jersey and Pennsylvania.

Eastern.

Notice is given that the register of holders of certificates of indebtedness is now being made up for the annual election. The names now on the register are those of the parties to whom the certificates were originally delivered. Present holders desiring to register can do so by presenting to Mr. Joshua Rose, at the office of the Trustees, No. 75 State street, Boston, a written statement of name, address and the denomination and number of each certificate held, or, if so required by the Trustees, on producing the certificates held, or a written order from the last registered holder. The voting register will be closed Nov. 30.

Foreclosure Sales.

Sales of railroad property under foreclosure are noted as follows:

Lake View & Collamer, at Cleveland, O., Nov. 3, under foreclosure and subject to prior liens of $30,000. The road and real estate were bought for $9,975 by H. Cushman, of Euclid; the equipment for $2,000 by Louis Harms. The road is 7¼ miles long, from Cleveland, O., to Euclid, and is a light road, built for suburban traffic.

Gulf, Colorado & Santa Fe.

The old board of directors has refused to recognize the new board as legally elected. The new board will begin suit at once to oust the old board.

Grand Trunk.

It is reported that a rupture has occurred between this company and the Allan Steamship Line, and that all the company's freight from Portland will be sent this winter by the Dominion and Beaver lines.

It is reported that the company is negotiating for a lease of the Hamilton & Northwestern road, chiefly for the purpose of securing a connection with Hamilton and a share of the business of that city.

Illinois Central.

The Land Department reports for October sales of 1,813.7 acres of land for $12,448.20. The cash collected on land contracts was $12,861.03.

The traffic on the line in Illinois (707 miles) was $588,367.00, against $526,246.89 in October, 1876, an increase of $62,120.11, or 11.8 per cent.

Meetings.

Meetings will be held as follows:

Old Colony, annual meeting, at the passenger station in Boston, Nov. 27, at 11 a. m.

Wilmington & Weldon, annual meeting, in Wilmington, N. C., Nov. 20.

Eastern, annual meeting, in Boston, Dec. 12.

Boston & Providence, annual meeting, at the passenger station in Boston, Nov. 21, at 11 a. m.

Mississippi Central.

The purchasers of this road at the late foreclosure sale have organized a new company known as the Central Mississippi Railroad Company. The capital stock is fixed at $372,000. The organization is in the interest of the Illinois Central Company.

The debt of the company to the State of Tennessee, including interest, now amounts to about $1,300,000, which is payable in State bonds and overdue coupons. It is understood that the new company will soon pay off this debt.

Minneapolis & St. Louis.

The last rail on the extension of this road southward was laid Nov. 10, and through trains began to run Nov. 12. The extension ends at Albert Lea, Minn., where connection is made with the Burlington, Cedar Rapids & Northern road, and also with the Southern Minnesota. Albert Lea is about 30 miles southward from the late terminus at Waseca, and 105 miles from Minneapolis, so that the company now has 120 miles of road, including the 15 miles of the leased Minneapolis & Duluth. The road will be worked in connection with the Burlington, Cedar Rapids & Northern, the two forming a north and south line from Burlington to St. Paul, 356 miles long.

Missouri, Iowa & Nebraska.

An agreement has been concluded between this company and the city of Keokuk, Ia., by which the company contracts to make Keokuk the eastern terminus of its road. The city is to give the right of way for a track from the bridge over the Des Moines River to the levee, to give sufficient ground for terminal purposes and to pay for some filling required on the levee. The terminus of the road is now at Alexandria, Mo., five miles below Keokuk, but no new track will be needed except in the latter city, as trains will use the St. Louis, Keokuk & Northwestern track from Alexandria to Keokuk. The change of terminus is to be made by Jan. 1.

Mobile & Ohio.

The Supreme Court of the United States has recently given its decision on an application for certain orders made by Wm. H. Hayes, T. Haskins Dupuy and others in the matter of the appeal taken by certain first-mortgage bondholders from the decree of foreclosure granted by the Circuit Court. The application was for orders setting aside the stay of proceedings against the sale of the road; increasing the appeal bond from $100,000 to $500,000, and permitting the applicants to have the road sold in order that they may complete the reorganization under their plan. The Court denied all the orders, and held that the amount of the appeal bond was sufficient, and that it was properly drawn. It was not necessary to include Hayes and associates as obligees, the obligation to Duncan and Elliott, trustees, being sufficient.

Missouri Pacific.

The lease to this company of the Osage Valley & Southern Kansas road, from Tipton, Mo., to Boonville, 25 miles, which will expire Dec. 31, has been renewed for five years from that date, at a rental of $18,000 per year. It is said that an effort was made by the Missouri, Kansas & Texas to secure a lease of the line.

New York Elevated.

The New York Court of Common Pleas has dissolved the injunction prohibiting this company from building its road through Front street and past the property of Rufus K. Story, who obtained the injunction. The Court held that Mr. Story had no property in the street further than the right to its ordinary use, and that he was not entitled to any compensation for its use by the road.

North & South, of Georgia.

This road was recently sold by the State of Georgia for $40,500 cash, the purchasers intending to organize a new company and to extend the road to an Atlanta connection. The Governor, at the request of the purchasers, agreed to accept $10,000 cash, and to allow the rest of the purchase money to remain until Jan. 1, 1879. It now appears, however, that the purchasers have not been able to comply with these conditions, and the road will probably have to be sold again.

Ohio & Mississippi.

The Ashley or New York board has issued a circular requesting stockholders to pay a contribution of 15 cents per share to meet the legal expenses necessary to maintain the claim of that board to be the legal board of directors of the company.

Pacific Railroads and the Government.

The Senate Judiciary Committee on Nov. 12 heard arguments from counsel for the Union and Central Pacific companies in opposition to the sinking fund bill of Senator Thurman. Messrs. Dillon and Huntington were also present for the purpose of presenting a proposition for the repayment of the Government aid bonds, but further consideration of the matter was postponed to Nov. 17.

The proposition which was to have been submitted is understood to be substantially as follows:

The two companies offer, first, to reconvey to the Government about 6,000,000 acres of the lands heretofore granted to them, with which they propose to be credited at the rate of $1.25 per acre.

Secondly, to pay into the United States Treasury $1,000,000 each per annum, to be paid in semi-annual installments, and also to pay into the Treasury semi-annually such amounts as added to the foregoing and to the earnings for Government transportation will create a sinking fund sufficient, with its accumulations of compound interest, to liquidate the total amounts advanced or to be advanced by the Government for interest on the bonds by the year 1905, or about five years subsequent to the average date of maturity of the bonds.

Parkersburg & Charleston.

Meetings are being held along the proposed line to advocate the construction of a narrow-gauge road from Parkersburg, W. Va., southward to Charleston on the Chesapeake & Ohio, a distance of nearly 70 miles.

Pennsylvania Petroleum.

The Meadville (Pa.) *Crawford Journal* of Nov. 10 says: "This new railroad which was graded from Titusville to Cambridge, some four or five years ago, has finally been abandoned. The four miles of track which were laid on the Cambridge end of the road were last week torn up, and this disposes of that enterprise for some years to come at least, and probably forever, although there is some talk of a speedy revival of the railroad interest."

Pittsburgh, Wheeling & Kentucky.

Work on this road is now progressing steadily and at latest accounts the track was laid from the junction with the Pittsburgh, Cincinnati & St. Louis near Holliday's Cove, W. Va., southward 10 miles to the town of Wellsburg. Between that point and Wheeling but little remains to be done besides the tracklaying.

Portland & Bridgeton.

It is proposed to build a railroad of 2 ft. gauge, on the pattern of the Billerica & Bedford, from Portland, Me., northwest to Bridgeton, about 40 miles. The road would carry the local business of a farming country.

Providence & Worcester.

At a special meeting held in Providence, R. I., Nov. 8, the stockholders voted to authorize the execution of a new mortgage on the property to secure an issue of $2,000,000 in 20 years, 6 per cent. bonds. This issue is for the purpose of funding the floating debt, which is stated at $1,528,000 principally in the form of long interest-bearing notes. It is to cover also, we believe, the outstanding bonded debt of the company, which amounts to $500,000. The company owns 51 miles of road, 31 miles being double track, and last year paid 8 per cent. dividends on its $2,000,000 of capital stock.

Quebec, Montreal, Ottawa & Occidental.

A proposition has been made to the Quebec Government to lease this road to a syndicate formed for the purpose. The lease proposed seems to meet with strong opposition.

Southwestern, of Kentucky.

A correspondent writes as follows of this road, heretofore noticed under the head of Harrodsburg & Southwestern: "The Southwestern Railway of Kentucky is now in operation, and extends from the town of Harrodsburg (population 5,000), county seat of Mercer County, Ky., to Harrodsburg Junction on the Cincinnati Southern. The road has been substantially built, ballasted with stone and equipped with new and elegant rolling stock; engine from the Pittsburgh Works, and coaches from Wilmington, Del. Much praise is due the citizens of Harrodsburg, and especially to the builder of the road, Dr. M. Tabler, for their energy and enterprise in securing for themselves railroad facilities at an expense of over $100,000."

Southeastern, of Canada.

The directors of the Missisquoi & Clyde Rivers Company, which owns the Vermont section of the Southeastern road, met at North Troy, Nov. 7, and resolved to relay the rails and put the road in repair at once. The management of the Passumpsic Company in the present troubles was condemned. A large force was put at work on the road the same day, and the track was all relaid by the following day.

Gen. Aulis, Roadmaster, and Mr. Emmons Raymond, President of the Passumpsic Company, have been arrested on charges of impeding traffic and stopping the mails. Both were released on bail. At latest accounts no change in the situation had taken place; the Southeastern was running trains, but no connection with the Passumpsic was allowed. The damage done to the road was not very great, only sufficient to prevent the passage of trains.

St. Paul & Pacific.

Our Amsterdam correspondent writes "The majority of the holders of certificates for bonds deposited with the committee of the St. Paul & Pacific Railroad have assented to the proposal heretofore mentioned, and the certificates (bonds) have been sold to the American parties at the prices given."

These prices were for the $1,200,000 loan, Branch Line, 70; consolidated ($2,800,000) loan, 26; second section Main Line loan of $3,000,000, 27¾; for the $6,000,000 loan of 1869, 32, and for the St. Vincent Extension and Brainerd Branch bonds 13¼ per cent. of par value, including all due and current interest; to be payable in gold in London within two months after the approval is known in America. The special stock issued to pay for the Glyndon cut-off is also purchased at price of issue.

St. Louis & Southeastern.

Gen. James H. Wilson, Receiver and General Manager of this road, has addressed a letter to the committee appointed at the recent meeting in Memphis, remonstrating against misrepresentations made with regard to his road. He denies the assertion that any trouble as to rates south from St. Louis is due to the course taken by his road, and protests against the means taken to shut out the road from through business south of Nashville as unfair.

St. Louis & San Francisco.

The St. Louis *Republican* of Nov. 6 says: "Mr. J. Blickensderfer, Jr., Chief Engineer of the St. Louis & San Francisco Railway, arrived in the city yesterday after a somewhat prolonged absence. For the past three months Mr. Blickensderfer has been engaged in making a horseback reconnoissance of the country between Vinita, Indian Territory, and Double Mountain, in extreme Western Texas. The original survey of the St. Louis & San Francisco was directly west from Vinita to California, but in the past year the management of the road have thought of abandoning a through line and satisfying themselves with a connection with the Texas & Pacific, near the New Mexico line. With a view to such a change of route the recent reconnoissance of the Chief Engineer was made.

"Mr. Blickensderfer left Vinita about the middle of August last, with two assistants, several horses, a supply wagon, camping materials, etc. The course was due southwest, through Indian Territory and Texas to a point on the surveyed Texas & Pacific, called on the maps Sulphur Springs. In this journey the Arkansas, Deep Fork, North Fork, Little, Canadian, Wichita, Red and Brazos rivers had to be crossed. The distance as traveled by the surveyors was 500 miles, but the actual railway distance will not exceed 430 miles. * *

"The trip back of another 500 miles was by a little different route. The whole 1,000 miles were accomplished in just eleven weeks. On the way back considerable difficulty was experienced in fording the Wichita, which was much swollen by rains.

"The line from Vinita passes diagonally through the Indian Territory in a southwest direction. It passes out of the Cherokee country, through the Seminole reservation and the Cheyenne and Arapahoe country, then through the Chickasaw nation into the Comanche and Apache country, about 30 miles east of Fort Sill, and crosses the Red River into Texas at the mouth of the Big Wichita. Mr. Blickensderfer represents the character of the country as generally good for railroad and agricultural purposes, especially so toward the western part of the route for grazing, being the heart of the grazing country of Texas. The country passed over is mostly of the secondary formation and coal abounds in a considerable portion. The rock formations are sandstone chiefly and limestone part of the way. A good deal of timber abounds along the line surveyed, all the way to Red River, consisting of oaks, post oaks being the principal. Beyond the Red River timber is scarce, also coal."

Texas & Pacific.

The State of Texas has entered suit in the Harrison County District Court, to have the charter and land grant of this company declared forfeited, in consequence of its failure to extend its lines as stipulated in the grant. The company has filed an application to have the case removed to the United States Circuit Court.

United New Jersey.

At a meeting held Nov. 9 the board of directors voted to decline Mr. Carnegie's offer to sell to the company the stock which he bought from the Longstreets. The price at which Mr. Carnegie bought the stock, and at which he offered it to the company, is said to have been $150 per share, the back dividends uncollected since the lease and the costs and expenses incurred by the Longstreets in the suit, making in all about $70,000 for 257 shares of stock, or about $272 per share. Mr. Carnegie states that he has no intention of continuing the suit whether his stock is taken by the company or not.

Vermont Valley.

A survey is being made of a line from Brattleboro, Vt., to South Vernon, probably for the purpose of connecting this road with the Connecticut River without using the Vermont & Massachusetts track.

Wabash.

The officers of this company state that holders of $13,000,000 out of about $17,000,000 bonds have agreed to fund coupons as proposed by the company, and have deposited their coupons. The company is paying promptly all coupons which become due under the agreement.

Western North Carolina.

For some time past the officers of this road have desired the assistance of a locomotive in the construction work west of the Swannanoa tunnel. Finally it was resolved to move one across the mountain on the highway road through the Swannanoa Gap, and after several weeks' work the attempt has succeeded, in spite of the many difficulties in the way. Work on the tracklaying to Asheville can now be carried on without waiting for the completion of the tunnel.

ANNUAL REPORTS.

Western Maryland.

This company owns a line from Baltimore west by north to Williamsport, Md., 90 miles, and it works under lease the Emmitsburg Branch, 7 miles, making 97 miles in all. The city of Baltimore owns a controlling interest in the road and has indorsed a large part of its bonds. The tracks through Baltimore are leased of the Northern Central Company and the depot in that city from the city. The following figures are from the report presented at the recent annual meeting for the year ending Sept. 30, 1877.

The stock and bonded debt are as follows:

Stock subscriptions ($7,599 per mile)		$683,933
First mortgage, unendorsed	$400,000	
First mortgage, endorsed by city of Baltimore	200,000	
Second preferred mortgage	600,000	
Second mortgage, endorsed by city of Baltimore	300,000	
Second mortgage, endorsed by Washington County	300,000	
Third mortgage, endorsed by city of Baltimore	875,000	
Fourth mortgage (city stock)	1,000,000	
Total bonds ($40,833 per mile)		3,675,000
Total ($48,433 per mile)		$4,358,933

The second mortgage has a sinking fund of $30,000. There are also funded coupons amounting to $175,271.

The work done was as follows:

	1876-77.	1875-76.	Inc. or Dec.	P. c.
Locomotive mileage	378,196	369,492	Inc.. 8,704	2.3
Passengers carried	339,111	342,566	Dec.. 3,455	1.0
Passenger mileage	6,582,241	6,737,061	Dec..154,820	2.3
Tons freight carried	131,367	112,690	Inc.. 18,677	16.6
Tonnage mileage	4,692,089	4,631,932	Inc.. 60,157	1.3
Av rate per pass. per mile	2.07 cts.	.....	....	....
Av. rate per ton per mile	3.47 "	.....	....	....

Of the passengers carried 167,299 were full fare; 97,484 at excursion rates; 67,411 commutation and mileage tickets; 2,451 at two-thirds rates and 4,466 half rate. The earnings for the year were:

	1876-77.	1875-76	Inc. or Dec.	P. c.
Passengers	$136,662 27	$139,313 42	Dec.. $2,651 15	1.9
Freight and express.	167,686 49	148,356 66	Inc.. 19,329 83	13.0
Milk and market	15,717 78	15,010 50	Inc.. 707 28	4.7
Mail and miscell'n's.	12,019 33	9,221 97	Inc.. 2,797 36	30.4
Total	$332,085 87	$311 902 55	Inc..$20,183 32	6.5
Expenses	219,940 57	215,556 18	Inc.. 4,384 39	2.0
Net earnings	$112,145 30	$96,346 37	Inc..$15,798 93	16.4
Gross earn. per mile.	3,423 57	3,254 74	Inc.. 168 83	5.2
Net " "	1,156 14	1,005 39	Inc.. 150 75	15.0
Per cent. of expenses.	66.23	69.11	Dec.. 2.88	4.2

Additional to the above stated earnings is $28,214.95 earned on the Northern Central tracks and paid as rental for the use of those tracks and terminal facilities. The decrease in passenger expenses is due chiefly to stoppage of travel in July. Nothing has been realized on the coal business, competition having forced rates below a paying point. The expenses include $27,870.05 paid on account of new equipment and $17,537.40 for ballasting road; they include last year the rent of Hillen Station, Baltimore, for a full year, against only ten months in the preceding year.

The report refers at considerable length to the anticipated increase of business from the construction of the proposed Baltimore & Hanover and Baltimore & Cumberland Valley roads, both of which, it is hoped, can be soon begun. The Harrisburg & Potomac connection seems to have been given up as an expected source of through business.

The report, after denying the rumors of a probable sale by the city of Baltimore of its interest in the road, says: "In regard to the company's ability in the future to pay the current interest on its unendorsed bonds, there is now no apparent reason why the payment of those upon the first mortgage need again be interrupted; but, as the company is already one coupon in arrears upon this class of bonds, which shall be paid by July 1 next, and as it is desirable that certain important improvements should be made at an early day, including a more extensive introduction of steel rails on the eastern end of the road, upon which the traffic, without that expected from the Baltimore & Hanover road, has already become quite heavy, and as the large necessary additions to the equipment recently made are not yet entirely paid for, the board of directors of this company, after due consultation with the city Finance Commissioners, has determined, if agreeable to holders, to offer to fund for ten years at 6 per cent. the seven overdue together with the four coupons next maturing upon the second preferred bonds; and it is believed that the interests of all concerned will be materially advanced by a general concurrence in this matter.

"In order that those most interested may the better understand the probabilities of their subsequently maturing coupons being paid promptly, it will suffice to say that when the payments now being made for new equipment are completed (the last in April next) the application to interest purposes of net revenue thus applied will, of itself, more than pay the interest on the second preferred bonds."

Grand Trunk.

The latest report of this company is for the half-year ending June 30, 1877, and covers the whole system of 1,389 miles worked, whereof 1,015 miles are owned and 374 miles leased. The comparisons are with the corresponding half-year, that ending June 30, 1876.

The charge to capital account for the half-year was £81,928. During this period £30,500 of the 6 per cent. International Bridge bonds have been redeemed out of the proceeds of debenture stock issues. The £500,000 first equipment mortgage 6 per cent. bonds became due Jan. 1, 1877, but the greater portion have since been renewed for various periods.

The passengers and freight carried for the half-year were:

	1877.	1876.	Inc. or Dec.	P. c.
Passengers carried	865,972	869,549	Dec.. 3,577	0.4
Tons freight carried	1,052,873	1,042,922	Inc.. 9,951	1.0
Av. receipt per passenger	5s.6¼d.	5s. 8d.	Dec.. 1¾d.	2.2
Average receipt per ton	11s. 2d.	12s. 8d.	Dec..1s. 6d.	11.8

The earnings for the half-year were as follows:

	1877.	1876	Inc. or Dec.	P. c.
Gross receipts	£874,711	£956,074	Dec..£81,362	8.5
Deduct discount on American currency	14,325	19,714	Dec.. 5,389	27.4
Actual earnings	£860,386	£936,359	Dec..£75,973	8.1
Working expenses and renewals	664,467	733,948	Dec.. 69,481	9.5
Net earnings	£195,919	£202,411	Dec.. £6,492	3.2
Per cent. of expenses	77.23	78.28	Dec.. 1.05	1.3

The earnings this year, reduced to American currency, were $2,088 gross, and $703 net per mile of road worked. The income account for the half-year was as follows:

Net earnings	£195,919
Deduct postal and military revenue due bondholders	16,596
Net balance	£179,323
Add balance from last half-year	11,567
Total	£190,890
Interest and exchange on loans, notes, etc	£6,685
Interest on British American Land Co., Montreal Seminary and Island Pond debentures	3,933
Atlantic & St. Lawrence lease	52,543
Lewiston & Auburn lease	1,849
Detroit Line lease	11,250
Montreal & Champlain bond interest	11,571
Buffalo & Lake Huron lease	34,000
Equipment bond interest	30,000
Perpetual 5 per cent. debenture stock	38,357
	190,188
Balance, June 30, 1877	£702

Interest and rentals for the half-year thus exceeded the net earnings by £10,865, and absorbed nearly all the balance on hand at the opening of the year.

The report says: "The passenger receipts were less by £7,325, or 2.96 per cent., on numbers decreased by 3,577, or 0.41 per cent., as compared with 1876. The receipts from freight traffic decreased £75,332, or 11.40 per cent., while the tonnage increased 9,951 tons, or 1 per cent. * * The working expenses were decreased in every item, excepting in that of miscellaneous expenses, which continue to show increased charges for taxes and insurance. There has been a very satisfactory reduction in the expenditure for fuel of £15,668, or over 10 per cent. The receipts in United States currency were $3,722,274, against $3,555,334, of which $1,150,092 was converted into gold, against $794,131 in 1876, entailing a loss of £14,325, against £19,714, being a decrease of £5,389. Gold fluctuated during the half-year from 104⅛ on March 12 to 107⅞ on April 17; the average being about 106, against an average on the corresponding period of 1876 of 113¼. * *

"The revenue suffered during the past half year from low rates, caused partly by the bad harvest in Canada in 1876, but still more by excessive competition among the trunk lines. That competition was slightly modified by the arrangements entered into in April last, and has now been terminated. The harvest of this year, both in Canada and the United States, is extremely favorable. The President has just returned from a visit of two months to Canada and the United States, and has met the Presidents of the trunk lines. He also spent a considerable time in discussing and arranging with Mr. Childers, President of the Great Western of Canada, the relations between the two companies. He believes the understandings which he has been able to establish with the various Presidents will result favorably to the general interest."

Illinois & St. Louis Bridge.

This company owns the great bridge over the Mississippi at St. Louis and operates the line from East St. Louis to the Union Depot in St. Louis, covering both the bridge and its approaches. The company's statement for the year ending April 30, 1877, is as follows:

	1876–77.	1875–76.	Increase.	P. c.
Earnings from upper roadway	$115,013	.....	.....	....
Earnings from lower roadway and tunnel	535,796	.....	.....	....
Rents	4,608	.....	.....	....
Total	$655,417	$464,406	$191,011	41.1
Maintenance	109,314	.....	.....	....
Movement of trains	262,691	.....	.....	....
Terminal charges and drayage	63,272	.....	.....	....
Total expenses	$435,277	$284,111	$151,166	53.2
Net earnings	$220,140	$180,295	$39,845	22.0
Per cent. of expenses	66.41	61.18	5 23	8.5

The bonded debt consists of $4,000,000 first-mortgage 7 per cent. bonds, $2,000,000 second-mortgage 7 per cent. bonds, and $1,250,000 9 per cent. tunnel bonds, requiring, to meet the annual interest, $532,500, or more than twice last year's net earnings.

The General Manager's report says: "Compared with the results of the previous year, the increase in the volume of business transferred across the bridge was considerable. We have moved during the current year 79,782 loaded freight cars, against 45,027 in the preceding year, and 16,164 in the year preceding that—the first after the first opening of the bridge. The number of paying railway passengers who crossed the bridge during the past year was 604,833, against 496,886 during the year preceding, while the number of foot and horse railroad passengers and vehicles that passed over the upper railway nearly equals the number for the preceding year, although on account of the destruction of part of the east approach by fire, of which specific mention is made hereafter, all upper roadway traffic, except for foot passengers, was stopped for six weeks.

"The gross earnings did not increase in proportion with the volume of business, for the reason that up to Feb. 5, 1877, the low rates caused by the competitive war with the ferry, referred to at length in my last report, prevailed. The old rates were gradually restored in February, 1877, but as the fire occurred just about that time (Feb. 19), the increased rates were available to us only during one month (April) of the year."

The heavy expenses are attributed to the fact that the burden of operating the bridge, managing the road over it and all the terminal expenses are thrown upon the Bridge Company by the railroads, without any additional compensation. The report further says:

"The contracts which some of the roads made with the Bridge Company before the bridge was built are entirely ignored.

"The average gross toll paid to us for freight was $4.25 per loaded car of all classes, and the average net result was only $1.65, showing that the expense of moving the freight and the service connected therewith was $2.69 per car, and that the net toll per railroad passenger, inclusive of express and mail, amounted to 13-7/8 cents. Had the roads complied with their part of the contract (the gross average toll paid us per car and passenger having been less than fixed by contract), the result of the management to us, in face of the losses incurred by the enormous diversion of freight by the roads to ferries and other transportation agencies, and in face of the low rates and loss of business by fire, would have been as follows:

Gross receipts in current year	$655,417
Expense of all classes for salaries, maintenance, etc	109,314
Net gains	$546,103

"And, inasmuch as it is safe to assume that the losses incurred by low rates during the past year and by the fire amounted to $150,000, this sum, added to the above, would have been sufficient to meet the interest on all the mortgages on the bridge. * * *

"On the night of Feb. 19, 1877, a portion of the east approach was destroyed by fire, which originated in some frame buildings adjacent to it, and which swept, fanned by a heavy northern gale, clear across the approach. The destruction was complete for a length of over 300 feet, from the east abutment to beyond Second street in East St. Louis, and covered the highest portion of the iron trestle. By energetic work, continued day and night, we succeeded in re-establishing all railway communication on the morning of Feb. 26, but the complete reconstruction of the approach available for all traffic was not accomplished until April 2. Thus the traffic over the bridge was completely suspended for railway traffic for six days, and for all upper roadway traffic for six weeks."

The Minor New York Railroads in 1876.

Name of Road.	Property. Miles of road owned	Miles of road leased	Locomotives	Passenger train cars	Freight and other cars	Liabilities. Stock	Funded debt	Other debt	Traffic. Train mileage	Passenger mileage	Tonnage mileage	Earnings. Gross earnings	Expenses	Net earnings	Gross earnings per mile	Net earnings per mile	Per cent. of expenses
						$	$	$				$	$	$	$	$	
Adirondack*	60	...	3	7	55	.....	.....	.....	67,454	685,670	459,470	73,713	69,442	4,271	1,219	71	94.2
Albany & Susquehanna†	177	...	45	39	1,720	3,500,000	5,942,000	.....	759,191	9,327,741	52,168,375	1,309,921	897,757	412,164	7,401	2,329	68.5
Bath & Hammondsport	9	...	2	7	4	75,350	38,000	9,000	19,144	180,883	27,467	11,218	8,366	2,852	1,193	303	74.7
Buffalo & Jamestown	67	...	5	11	115	1,362,154	1,125,500	176,303	170,002	3,748,986	1,679,087	164,807	137,115	27,692	2,478	416	83.2
Buffalo, New York & Philadelphia	121	...	23	20	1,037	1,806,650	3,437,500	1,182,979	476,089	4,506,526	31,109,939	656,514	427,983	228,531	5,426	1,889	65.1
Cayuga	38	...	6	9	44	300,000	1,000,000	16 687	96,764	882,761	5,597,298	89,073	114,223	‡25,150	2,344	.....	128.3
Cayuga & Susquehanna§	35	...	..	..	.....	589,110	.....	.....	90,597	661,675	2,012,462	75,314	80,298	‡4,984	2,152	.....	107.1
Cazenovia, Canastota & De Ruyter	15	...	2	2	12	614,000	150,000	13,233	28,290	214,669	43,424	18,305	22,095	‡3,790	1,220	.....	122.7
Clove Branch	4	...	..	..	.....	150,000	.....	.....	.....	.....	158,581	18,732	13,829	4,903	4,675	1,226	73.9
Cooperstown & Susquehanna Valley	16	...	2	3	11	308,405	140,000	6,816	21,504	334,047	136,918	33,595	26,367	7,228	2,100	452	78.5
Corning, Cowanesque & Antrim‖	64	...	13	8	750	1,900,000	500,000	.....	244,383	1,268,298	12,903,620	341,082	172,276	168,806	5,329	2,634	50.5
Dunkirk, Allegheny Valley & Pittsburgh	91	...	12	13	88	1,300,000	3,200,000	194,403	406,071	2,581,014	21,867,613	398,633	343,412	55,221	4,381	607	86.1
Dutchess & Columbia	59	...	..	..	.....	1,499,500	2,500,000	.....	116,756	.....	.....	189,620	182,650	6,970	3,214	118	96.1
Flushing, North Shore & Central (six months to April 30)	53	...	16	34	76	814,925	3,908,683	598,078	222,385	.....	.....	315,553	246,615	68,838	5,954	1,299	78.0
Fonda, Johnstown & Gloversville	10	16	5	6	10	300,000	300,000	49,002	79,068	1,242,800	412,170	114,726	72,890	41,836	4,413	1,809	63.4
Geneva, Ithaca & Athens	76	...	9	9	147	980,600	1,406,000	448,457	287,334	2,494,448	12,029,950	269,499	292,747	‡23,248	3,547	.....	108.6
Greene§	8	...	..	..	.....	200,000	170,000	28,876	24,022	303,474	1,425,808	38,945	34,601	4,344	4,868	543	88.7
Greenwich & Johnsonville	14	...	..	..	.....	130,898	185,500	20,000	18,110	243,408	152,191	31,642	16,973	14,669	2,260	1,048	53.7
Harlem Extension¶	113	...	11	8	185	.....	.....	.....	201,069	2,567,395	4,294,872	293,676	219,862	73,814	2,599	653	74.8
Lake Champlain & Moriah	10	...	6	2	73	200,000	104,000	915	31,248	3,915	1,290,058	109,103	76,186	32,917	10,910	3,292	69.9
Long Island (first half year)	158	...	26	67	260	3,300,000	1,500,000	452,596	347,945	.....	.....	328,946	268,470	60,476	2,082	383	81.6
Long Island (second half year)**	158	162	58	157	433	3,260,600	1,500,500	455,590	614,931	1,629,865	.....	820,951	482,691	338,260	2,565	1,057	58.8
Middleburg & Schoharie	6	...	1	...	2	85,800	17,000	200	16,150	57,500	29,882	7,718	5,905	1,813	1,286	302	76.7
Middletown & Crawford	10	...	..	..	.....	124,138	70,000	.....	17,680	155,512	73,370	20,685	16,107	4,578	2,068	458	77.8
New York & Canada†	112	...	..	..	.....	4,000,000	4,000,000	216,586	245,180	4,203,986	7,185,137	370,961	259,673	111,288	3,312	994	70.0
New York & Oswego Midland	371	..	86	77	1,759	6,800,522	16,073,500	6,498,502	368,874	4,052,620	12,957,503	535,845	486,699	49,146	1,444	132	90.8
Ogdensburg & Lake Champlain	122	...	34	26	1,015	5,077,000	968,000	.....	457,247	4,185,143	20,141,083	568,294	398,873	169,421	4,658	1,389	70.2
Ontario Southern	34	...	3	4	78	558,300	994,300	17,374	29,914	245,815	504,680	24,089	36,560	‡12,471	709	.....	152.3
Oswego & Syracuse§	35	...	16	19	303	1,320,400	123,500	323,943	264,660	3,311,049	10,074,079	382,974	265,643	117,331	10,942	3,352	69.4
Port Jervis & Monticello	24	...	2	2	4	.....	.....	.....	39,000	489,505	342,000	35,913	30,346	5,567	1,496	232	84.3
Poughkeepsie, Hartford & Boston	47	...	4	5	60	850,000	535,000	14,784	84,240	755,232	558,506	73,943	56,543	17,400	1,573	370	76.4
Rensselaer & Saratoga†	79	103	54	110	1,557	6,762,000	2,000,000	.....	714,062	21,022,506	31,790,850	1,626,783	1,049,187	577,596	8,938	3,174	64.5
Rhinebeck & Connecticut	36	6	5	6	180	614,500	800,000	41,316	56,911	181,917	3,275,567	78,403	66,495	11,908	1,867	284	85.3
Rochester & Pine Creek	7	...	2	2	1	120,127	15,000	.....	.....	9,500	77,590	41,650	8,747	8,078	669	1,346	103	92.4
Rochester & State Line††	25	...	2	...	1	25,234	1,182,000	473,302	92,400	503,931	90,058	22,477	22,579	‡102	899	.....	100.4
Rome & Clinton	13	...	..	..	.....	274,000	38,500	9,000	15,449	226,444	297,984	23,890	30,693	‡6,803	1,838	.....	128.4
Rome, Watertown & Ogdensburg	380	29	57	74	1,193	3,147,600	7,246,900	494,185	977,020	15,588,607	20,366,365	1,221,727	944,153	277,574	2,987	679	77.3
Schoharie Valley	4	...	2	2	.....	100,000	34,500	.....	12,500	180,000	57,080	16,090	11,924	4,166	4,023	1,042	74.5
Skaneateles	5	...	2	2	3	77,800	35,000	.....	14,500	138,700	62,500	23,211	15,469	7,802	4,642	1,560	66.4
Southern Central	114	...	14	15	407	1,790,235	2,100,000	403,500	474,098	3,397,832	13,396,425	607,109	393,081	214,028	5,326	1,877	64.7
Southern, of Long Island (half year)	71	...	16	45	104	291,600	2,918,850	346,631	.....	.....	.....	215,133	181,873	33,260	3,030	468	84.6
Staten Island‡‡	13	...	4	15	.....	210,000	300,000	.....	72,786	2,456,792	.....	247,931	193,755	54,176	.....	.....	79.4
Sterling Mountain	8	...	2	1	144	80,000	350,000	.....	4,500	2,900	152,295	15,479	15,728	‡249	1,935	.....	101.5
Syracuse, Binghamton & New York§	81	...	7	11	320	2,004,000	1,670,000	22,836	441,554	4,575,721	38,807,191	670,178	515,329	154,849	8,274	1,901	76.9
Syracuse & Chenango	45	...	3	7	60	729,700	1,142,550	20,000	155,099	1,588,466	532,422	75,453	50,451	25,002	1,677	556	66.8
Troy & Boston	53	13	15	30	370	1,609,010	2,179,500	148,549	219,820	5,605,546	13,908,977	566,840	298,334	268,206	7,979	3,777	52.7
Ulster & Delaware	74	...	7	12	132	1,152,100	1,342,600	74,793	96,892	1,772,804	1,421,646	164,944	151,251	13,693	2,229	185	91.7
Utica, Chenango & Susquehanna Valley§	120	...	17	21	4	4,000,000	.....	132,455	287,377	5,360,597	12,344,669	462,542	397,906	64,636	3,855	539	86.0
Utica, Clinton & Binghamton	31	...	2	5	.....	640,326	800,000	54,847	49,429	911,546	1,930,434	84,799	92,112	‡7,313	2,736	.....	108.6
Utica, Ithaca & Elmira	98	...	9	17	50	1,004,100	1,500,000	250,000	261,698	2,766,132	2,212,645	203,870	120,283	83,587	2,080	853	59.0
Valley§	12	...	..	..	.....	750,000	.....	86,589	67,308	767,942	7,890,674	185,485	126,647	58,838	16,125	5,116	68.5
Wallkill Valley*	33	...	..	..	.....	.....	.....	.....	36,266	616,505	252,889	40,068	51,902	‡11,814	1,215	.....	129.2
Warwick Valley	10	...	..	..	.....	225,000	60,000	.....	19,820	278,010	.....	48,313	27,452	20,861	4,831	2,086	56.8

* Receiver's report and does not state liabilities.
† Leased and worked by Delaware & Hudson Canal Co.
‡ Deficit.
§ Leased by Delaware, Lackawanna & Western R. R. Co.
‖ Leased and worked by Fall Brook Coal Co.
¶ Leased by Central Vermont R. R. Co.
** Includes Flushing, North Shore & Central and Southern roads, leased. †† Road unfinished; mileage given is that completed and worked.
‡‡ Includes receipts and expenses of ferry between Staten Island & New York.

The reports are those made to the State Engineer of New York for the year ending Sept. 30, 1876, and the table includes only those roads whose reports have not been otherwise published. Two roads, the Dutchess & Columbia and the Clove Branch, make incomplete reports in consequence of the destruction of their books and papers by fire. Since the close of the year six roads, the Cayuga, the Cazenovia, Canastota & De Ruyter, the Dutchess & Columbia, the Geneva, Ithaca & Athens, the Syracuse & Chenango and the Wallkill Valley, have been sold under foreclosure and reorganized. The Rome & Clinton and the Utica, Clinton & Binghamton are leased by the Delaware & Hudson Canal Company as guarantor of a former lease to the New York & Oswego Midland, and operated for account of the lessee by the Delaware, Lackawanna & Western Company. Where no equipment is reported, it is hired, or else furnished by lessee in the case of leased roads.

Dividends paid on stock are reported by the Albany & Susquehanna; Cayuga & Susquehanna; Corning, Cowanesque & Antrim; Greene; Lake Champlain & Moriah; Oswego & Syracuse; Rensselaer & Saratoga; Syracuse, Binghamton & New York; Troy & Boston; Utica, Chenango & Susquehanna Valley; Valley, and Warwick Valley. All but three are leased roads, the three exceptions being the Lake Champlain & Moriah, the Troy & Boston and the Warwick Valley.